

## 5.0 AN EVALUATION OF THE POTENTIAL SOCIAL DESIRABILITY OF ALTERNATIVE LAND USE CONTROL MECHANISMS

Historically, the regulation of the use of private real property in the United States has been performed primarily through the enactment and implementation of municipal zoning procedures, subdivision regulations, building codes, and eminent domain condemnation procedures. However, each of these mechanisms is restricted in its application and limited in its effectiveness by numerous administrative, economic, judicial, legal, and political problems.\* Consequently, these mechanisms do not constitute, either individually or in combination, socially ideal methods for the regulation of private real property.

Therefore, the possibility that some alternative regulatory policies might be capable of producing patterns of development which are more socially desirable than the patterns of development which are produced by these traditional regulatory mechanisms warrants investigation. This chapter investigates this possibility with respect to seven innovative and, as yet, relatively untried regulatory policies. In particular, this chapter evaluates the information requirements and information retrieval, considerations associated with each of these policies; the potential inequities, abuses, and enforcement problems which are likely to arise with each of these policies; the legal constraints and political considerations which might limit the applicability of each of these policies ; the expected impact of each of these policies upon land use patterns; and the extent to which each of these policies promotes the attainment of the socially optimal pattern of development.\*\*

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\*See Chapter 3.0 for a detailed discussion of these issues.

\*\*The identification of the socially optimal pattern of development in any community requires detailed knowledge of the social welfare function of that community. However, since the obtaining of this detailed knowledge inevitably is impracticable, it is generally impossible to identify this pattern of development in any community. Therefore, it is also impossible to determine the extent to which the pattern of development which is produced by any policy deviates from the socially optimal pattern of development. Nevertheless, so long as the preferences of each member of society are weighted positively in any community's social welfare function, it is possible to determine whether any change in the pattern of development of the community which is produced by any particular policy will unambiguously produce

Specifically, Section 5.1 contains an evaluation of a policy of ad valorem property taxation with tax rates conditional upon land use. A policy requiring the payment of annual “externality” fees to the government by the owners of properties upon which external effects are generated is assessed in Section 5.2. Next, Section 5.3 appraises a policy providing for the transfer of a lump-sum payment for externalities whenever the permissible land use status of any property is changed. A policy of convening public hearings to promote negotiated settlements of externality problems among all individuals who are affected by these problems is investigated in Section 5.4. Section 5.5 evaluates a policy of publicly purchasing scenic or environmental easements. A policy encouraging the formation of landowner development corporations is appraised in Section 5.6. Then, Section 5.7 assesses a policy requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these new developments.

In Section 5.8, the considerations which should be taken into account in determining the most appropriate level of government to implement any of these policies are enumerated. Finally, Section 5.9 presents general conclusions and provides recommendations concerning the potential social desirability of implementing any of these prospective policies.

## 5.1 Ad Valorem Taxation Conditional Upon Land Use

An ad valorem tax is expressed in terms of a percentage of the sales price or market value of the item to which the tax is applied. Thus, the property tax constitutes an ad valorem tax applied to the value of land and improvements to land. This section investigates the social desirability of establishing an additional ad valorem tax on real

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an increase in social welfare. In particular, under these conditions, if any policy produces a change in the pattern of development of the community which increases the personal welfare of at least one individual without decreasing the personal welfare of any other individual, this change in the pattern of development will unambiguously increase social welfare and, hence, will unambiguously promote the attainment of social optimality.

property which attempts to exercise optimal control over the generation of externalities between private land uses by applying different ad valorem tax rates to the values of properties on which different land uses are located.

For any taxation policy to be capable of exercising optimal control over the generation of externalities between private land uses, any modification of the activity which is performed upon any parcel of land must precipitate a change in the total tax bill imposed upon the owners of this property which is equal in magnitude to the change in the external costs incurred by all other members of society which results from this modification of activity. If this condition is fulfilled by a taxation policy, any property owner who is considering any modification of the activity performed on his land will be compelled to recognize and motivated to include appropriately in his decision-making the external costs which his land use activities impose upon the remainder of society. Specifically, he will be motivated to refrain from initiating any modification of activity which will impose additional external costs upon other members of society (and, hence, will precipitate an increase in his total tax bill) in excess of the additional benefits which he will obtain from this modification of activity. Similarly, he will be motivated to adopt any modification of activity which will generate a reduction in the external costs which are incurred by the remainder of society (and, hence, will provide a decrease in his total tax bill) in excess of the decrease in total benefits which he absorbs as a result of this modification of activity.

For a policy of ad valorem property taxation with tax rates conditional upon land use to be potentially capable of producing these results, it must be possible to define an exhaustive set of mutually exclusive land use classifications such that, for each classification which is delineated, the external costs which are attributable to the pursuit upon any particular parcel of land of any activity which is in conformity with the stipulations of the classification are strictly proportional to the assessed value of the parcel. If a set of land use classifications which fulfills this requirement can be developed, it will be possible to express the external cost which is attributable to the pursuit of any land use activity upon any parcel of land as:

$$EC_i = K_j AV_i$$

where:  $EC_i$  = the external cost attributable to the activity performed upon parcel i,

$K_j$  = the external cost per dollar of assessed value of any parcel which is attributable to the pursuit upon that parcel of any activity which is in conformity with the stipulations of land use classification  $j$  ( $j = 1, \dots, n$ ), and

$AV_i$  = the assessed value of parcel  $i$ .

Then, if the activity which is performed upon parcel  $i$  is modified in a manner such that land use classification  $j$  remains applicable to the activity which is performed upon parcel  $i$ , the change in the external costs attributable to the activity performed on parcel  $i$ ,  $\Delta EC_i$ , will be:

$$\Delta EC_i = EC_i' - EC_i = K_j AV_i' - K_j AV_i = K_j (AV_i' - AV_i)$$

where  $EC_i$  and  $AV_i$  represent the values which prevail before the modification of activity, while  $EC_i'$  and  $AV_i'$  represent the values which exist after this modification. Similarly, if the activity which is performed upon parcel  $i$  is modified in a manner which causes a different land use classification  $k$  to be applicable to the activity which is performed upon this parcel, this change in external cost will be:

$$\Delta EC_i = EC_i' - EC_i = K_k AV_i' - K_j AV_i$$

In either event, the imposition upon each property owner of an ad valorem tax upon the assessed value of his property at the rate  $K_j$  ( $j = 1, \dots, n$ ) when the activity pursued upon this property conforms to the stipulations of land use classification  $j$  will cause this property owner to absorb changes in his total tax bill which are identically equal to any changes in external costs which are attributable to modifications of the activity which is performed upon his property. These changes in his total tax bill will induce each property owner to initiate each modification of activity which will provide additional benefits to society which exceed the incremental costs which will be incurred by society in performing this modification and to refrain from initiating any modification of activity which will provide additional benefits to society which are less than these incremental costs. Consequently, it can be concluded that, if an acceptable set of land use classifications can be identified, it is theoretically possible to develop a policy of ad valorem property taxation with tax rates conditional upon land use which is potentially capable of promoting the attainment of the socially optimal pattern of land use.

### 5.1.1 Expected Deviations from Social Optimality

The theoretical possibility of attaining social optimality through the application of a policy of ad valorem property taxation with tax rates conditional upon land use depends crucially upon the specification of an exhaustive set of mutually exclusive land use classifications such that, for each classification which is delineated, the external costs which are attributable to the pursuit upon any particular parcel of land of any activity which conforms to the stipulations of the classification are strictly proportional to the assessed value of the parcel. Superficially, although this assumption of strict proportionality is obviously strong, it does not appear to be qualitatively unreasonable. Since, in the absence of malicious behavior, a property owner will not initiate a modification of the activity which he pursues on his property which will cause an increase in the external costs which are incurred by the remainder of society unless he expects that this modification of activity will produce an increase in the return which he obtains from his property, it appears reasonable to assume that any increase in the external costs attributable to the use of a particular parcel of land will be positively related to the returns which are earned by that parcel of land.

Moreover, unless the increased returns which result from this modification of activity are purely psychic returns which are valued only by the present owner of the property, this increase in returns should produce an increase in the market value of the property as potential owners of the property increase the amount of income which they are willing to offer in exchange for the property. Thus, if the assessed value of the property increases as its market value increases, it appears generally reasonable to conclude that any increase in the external costs which are attributable to the activity which is performed upon a parcel of land will be accompanied by an increase in the assessed value of this parcel of land.

However, it cannot be concluded on the basis of this analysis that any increase in the assessed value of any parcel of land will be accompanied by an increase in the external costs which are attributable to the activity which is performed on this parcel. Rather, increases in the assessed value of a parcel of land can occur in many situations which involve no changes in the external costs which are attributable to the activity performed on this parcel. In fact, in numerous instances increases in the assessed values of properties will be associated with decreases in the external costs which are imposed upon the remainder of society by the activities pursued on these properties.

For example, installing new siding on a residential property can be expected to both increase the assessed value of the house and decrease the external costs (or increase the external benefits) which are obtained by the remainder of society from the appearance of this house. Similarly, initiating runoff control procedures on an agricultural property may both increase the productivity and, hence, the assessed value of the property and reduce the external costs which are borne by the remainder of society as a result of agricultural runoff. Finally, the installation on industrial property of pollution control equipment which has no adverse effect upon the production of the firm's desired output will both increase the assessed value of the property (to the extent that some portion of the cost of the pollution control equipment can be recovered if the firm decides to discontinue using this equipment) and reduce the external costs which are imposed upon the remainder of society by the pollution generated by the firm's production. In each of these situations, if the modification of land use activity which is undertaken does not precipitate a change in the property's land use classification, the imposition of an ad valorem tax will unambiguously produce an increase in the property owner's total tax bill; and this increase in his total tax bill will induce the property owner to refrain from adopting the modification of activity. Hence, within any land use classification which is established, the imposition of an ad valorem tax may discourage some property owners from undertaking some socially desirable actions to reduce the generation of adverse external effects.

Moreover, although this problem can be ameliorated to some extent by creating a more detailed structure of land use classifications (e.g., by distinguishing between residential properties with new siding and residential properties without new siding, between agricultural properties with runoff control procedures and agricultural properties without runoff control procedures, and between manufacturing properties with pollution control equipment and manufacturing properties without pollution control equipment) and, then, applying different ad valorem tax rates to each of these more detailed classifications, a disincentive to adopt any strategy to control the generation of external effects which does not appropriately decrease the assessed value of property will remain with each of the land use classifications which are ultimately delineated. Thus, conceivably, the theoretically optimal ad valorem taxation policy might incorporate a land use classification system which is so detailed that any modification of the activity which is performed upon any parcel of land will precipitate a change in the land use classification which is applicable to that parcel of land.

Clearly, the requirement that a property owner must accurately identify and apply two different tax rates to evaluate any prospective modification of his land use activity would cause the social desirability of implementing a policy of ad valorem property taxation with tax rates conditional upon land use at this level of complexity to be extremely dubious. Consequently, any practical policy of this type will almost invariably have to embody a land use classification system which is incapable of promoting the full attainment of the theoretically optimal pattern of development.

#### 5.1.2 Information Requirements and Information Retrieval Considerations

The development of any policy of ad valorem property taxation with tax rates conditional upon land use requires the delineation of an acceptable system of land use classifications and the determination of the appropriate ad valorem tax rate to employ with each of these classifications. To delineate an acceptable system of land use classifications, it is necessary, first, to identify mutually exclusive sets of properties such that the ratio of the external costs which are attributable to the activity which is performed upon each property within a particular set to the assessed value of that property is reasonably constant. Then, those attributes of properties which distinguish the properties in each of these sets from the properties assigned to the other sets must be isolated. To perform these tasks, it is necessary to obtain data which specify, for at least a representative sample of the properties to which the policy will be applied, the assessed value of each property in the sample, the attributes of this property which might distinguish it from properties to which different land use classifications are likely to be assigned, and the external costs which are attributable to the activity which is performed on this property.

The data specifying the assessed value of each property in the sample can be readily obtained from existing property tax records. Similarly, a substantial amount of information concerning the attributes of each of these properties can be obtained from existing land use and municipal zoning records. Moreover, any additional information which is desired concerning these attributes can be obtained merely by conducting an inspection of the property. Thus, although the cost of collecting these data may be high (especially if sophisticated instruments are required to measure the intensity of a particular attribute), the obtaining of information concerning the attributes of each property should be technically feasible.

However, unfortunately, obtaining reasonably reliable estimates of the external costs which are attributable to the activity which is performed upon any particular parcel of land is likely to be extremely difficult, if not impossible. Conceptually, the external cost which is imposed upon any individual by the activity which is performed upon any parcel of land can be measured as the maximum amount of income which that individual would be willing to pay to avoid the adverse external effects which are generated by that activity. If the sole objective of this individual is the maximization of the profits which he earns from his property, this maximum amount of income will be equal to the difference between the profits which he will earn from his property when no external effects are generated by the activity under consideration and the profits which he will earn from his property when the existing quantity of external effects are generated. In general, reasonable estimates of this difference in profits should be obtainable from observed market data. However, if the objective of the individual who absorbs the external effects is the maximization of his satisfaction, the estimation of this maximum amount of income requires detailed knowledge of this individual's tastes and preferences -- knowledge which he generally will have no motivation to divulge accurately to the administrators of any government program.

In particular, to the extent that the individual perceives that he will never be required to surrender the amount of income which he indicates he would be willing to surrender, it will be rational for him to overstate the amount of income that he would be willing to pay to avoid any external effect in order to obtain more stringent restrictions upon the generation of this external effect. Conversely, if the number of individuals who absorb the external effect is sufficiently large that control of the external effect assumes the properties of a public good and if the individual perceives that he may be required to surrender the amount of income which he indicates that he would be willing to surrender, it will be rational for the individual to understate the amount of income that he would be willing to pay to avoid the external effect. Given the large number of potential contributors to the control of the external effect, his success in avoiding the external effect will be relatively insensitive to the amount which he contributes to its control. Thus, only when merely a few individuals are impacted by an external effect and each of these individuals believes that he will be required to surrender the amount of income which he indicates he would be willing to surrender for the control of this effect is there any reasonable expectation that an individual will provide an unbiased estimate of the maximum amount of income which he would be willing to



pay to avoid the external effect. Obviously, these conditions will actually be fulfilled in only a small percentage of the situations in which the control of external effects might be socially desirable. Moreover, perversely, these accurate revelations will occur in precisely those situations in which the control of the external effect most nearly assumes the properties of a private good and, hence, can be expected to be performed through voluntary negotiation without any public intervention. Consequently, the conclusion is unavoidable that, in those situations where the attainment of social optimality without public intervention is most unlikely, the obtaining of reasonably accurate estimates of the external costs which are attributable to the activity which is pursued upon any particular parcel of land may be impossible.

Moreover, this conclusion can be stated with even greater conviction when the external effect which is absorbed by any individual is generated by a variety of different activities which are performed on several different parcels of land. In any situation of this type (e.g., the generation of air pollution or water pollution in an urban area), the accurate estimation of the external costs which are attributable to the adverse external effects generated on any particular parcel of land will require the determination of the portion of the external effects absorbed by each other member of society which are attributable to the activity performed upon that parcel of land. In many instances, this determination may be technically infeasible. Therefore, in any realistic situation, the estimates of external costs which will be obtainable for the delineation of an acceptable system of land use classification will necessarily be relatively crude.

Nevertheless, after the best attainable estimates of these external costs have been developed and, subsequently, an acceptable system of land use classifications has been specified, the best estimate of the appropriate ad valorem tax rate to employ with each of these classifications can be calculated as the quotient of the sum of the external costs which are attributable to the activities which are performed upon all of the properties in the sample to which this classification will be assigned and the sum of the assessed values of all of these properties. In addition, by carefully comparing the attributes of all of the properties in the sample to which one land use classification has been assigned to the attributes of all of the properties in the sample to which each other classification has been assigned, it should be possible to develop a set of criteria which will permit the determination of the most appropriate land use classification to assign to each parcel of land to which this ad valorem taxation policy will be applied.

However, to perform this determination, it will next be necessary to obtain information concerning the extent to which each of these parcels of land satisfies these criteria. Specifically, it will be necessary to gather information describing those attributes of each of these properties which corresponds to the attributes of the parcels in the representative sample which have been utilized to define these criteria. Moreover, to identify those instances in which modifications in the activities which are performed on parcels of land should be accompanied by changes in the land use classifications and ad valorem tax rates which are applied to these properties, it will also be necessary to monitor continually these attributes of each property to which the policy is applied. In addition, the calculation of the appropriate total tax bill to impose upon each of these properties at each point in time requires the continual reassessment of the values of the properties. Finally, to validate and, when necessary, to refine the system of land use classifications and the ad valorem tax rates to employ with these classifications, it will be desirable periodically to produce revised estimates of the external costs which are attributable to the activities which are performed on a representative sample of these properties.

Yet, after all of this information has been accumulated, the information retrieval capabilities which are required for the implementation of this taxation policy is remarkably simple. Specifically, recognizing that comprehensive data files stipulating the assessed value of each property within any municipality already have been assembled for the calculation of the standard property tax, the implementation of a policy of ad valorem property taxation with tax rates conditional upon land use requires only, first, the addition to this data file of the land use classification which has been assigned to each property in the municipality and, second, the creation of a new data file specifying the ad valorem tax rate which is employed with each land use classification. Then, to calculate the total tax bill of any property, it is necessary merely to extract from the initial data file the assessed value and the land use classification of this property; next, to retrieve from the new data file the ad valorem tax rate which applies to this land use classification; and, finally, to multiply the assessed value of the property by the ad valorem tax rate to determine the property's total tax bill. Consequently, the cost of information retrieval required for the implementation of this taxation policy should not be substantially greater than the cost of information retrieval which has been experienced with the standard property tax.

### 5.1.3 Potential Inequities, Abuses, and Enforcement Problems

The total tax bill which is imposed upon any property owner by a policy of ad valorem property taxation with tax rates conditional upon land use is strictly proportional to the assessed value of his property. Ostensibly, the assessed value of any property is systematically related to the market value of this property. However, because any individual parcel of land is exchanged in the market only infrequently, it is impossible to guarantee that this systematic relationship between the assessed value and the market value of each property actually exists at all points in time. In addition, the appraisal practices which are employed to determine the assessed value of a property require the application of considerable amounts of judgment by the assessor. Consequently, substantial opportunity exists for the arbitrary and preferential assessment of property values. Moreover, since the obtaining of a preferentially low assessment of the value of any property will reduce the total tax bill of the owner of this property, a motivation exists for any property owner to attempt to bribe the tax assessor to assign an unrealistically low assessed value to his property. Nevertheless, so long as the requirement that the assessed values of properties must be systematically related to the market values of these properties is retained, reasonable limits can be imposed upon the extent to which the preferential assessment of property introduces inequities or abuses into any policy of ad valorem property taxation simply by periodically comparing the assessed values of recently exchanged properties with their market prices.

Moreover, the obvious desirability of retaining this control on the unintentional or intentional introduction of inequities or abuses into the assessment and taxation of property constitutes a strong argument against the adoption of any changes in existing assessment practices intended to correct any of the deviations from social optimality which are generated by a policy of ad valorem property taxation. Thus, it generally would be inadvisable to adopt a strategy of decreasing the assessed value of a property on which a modification of activity has produced both a decrease in external costs and an increase in the market value of the property. The adoption of this strategy would destroy the linkage between assessed values and market values and, hence, would increase the probability of the arbitrary preferential assessment of property values.

In addition to being strictly proportional to the assessed value of the property, the total tax bill which is imposed upon a property by a policy of ad valorem property taxation with tax rates conditional upon land use is also sensitive to the land use classification which is assigned to the property, since this land use classification will determine the ad valorem tax rate which is applied to this property. Hence, a monitoring system must be developed to determine the initial land use classification of each parcel of land to which the policy will be applied and, subsequently, to detect the need to change the land use classification of parcels whose utilizations have been modified. This need for the continual monitoring of the activities performed on properties introduces two additional prospects for inequities and abuses.

First, the unintentional or intentional assignment of an inappropriate land use classification to any parcel of land will impose upon the owner of this parcel of land either an undesirably high or an undesirably low total tax bill. However, the probability that inequities of this type might arise can be minimized by defining the specifications which delineate each land use classification in terms of readily observable and measurable attributes of land use activities. Yet, this strategy will be effective in promoting social optimality through the application of a policy of ad valorem property taxation with tax rates conditional upon land use only if these readily observable and measurable attributes constitute those attributes which distinguish appropriately among land use classifications in terms of the promotion of the attainment of social optimality. Thus, in general, a tradeoff between the ease of monitoring land use activities and the effective promotion of social optimality must be accomplished in developing the best attainable land use classification system for any actual taxation policy of this type. Obviously, the more subtle are the distinctions between different land use classifications, the greater will be the prospects of inequities or abuses resulting from the inappropriate assignment of land use classifications to parcels of land.

In addition, inconsistencies in the temporal pattern of the monitoring of land use activities can produce further inequities in the impact of this taxation policy upon different property owners. Only a procedure which continuously monitors the activity which is performed on each parcel of land to which the policy is applied will successfully detect each modification of activity on any parcel of land which should precipitate a change in the total tax bill imposed upon that parcel of land at precisely that point in time at which this modification of activity is undertaken. Consequently, any practical monitoring procedure

will necessarily produce some inequities between property owners whose modifications of activity are detected immediately after the modifications are performed and property owners whose modifications of activity are not detected until a substantial period of time has elapsed after the initiation of the modifications.

Finally, if, as is likely, the external costs which are attributable to the pursuit of any particular activity in any particular situation cannot be measured with sufficient accuracy to constitute a strongly defensible basis for the determination of the appropriate ad valorem tax rate to apply to each land use classification, the tax rates which actually are applied undoubtedly will be influenced to some extent by the political process. If this process is especially responsive to pressure exerted by potential developers, the tax rates which are applied to land use classifications whose development promises high profits to these developers are likely to be set at levels which are low relative to the socially optimal tax rates, while the tax rates which are applied to land use classifications whose continued existence retards developments which promise high profits to these developers are likely to be set at levels which are higher than the socially optimal tax rates. Conversely, if environmental activists exert excessive influence over the process through which tax rates are established, the opposite biases in tax rates are likely to be observed. However, there is no reason to believe that either of these biases will be observed generally -- or that the biases will counteract each other to produce a system of tax rates which approximates the socially optimal system. Rather, examples of both types of biases can be observed in the municipal zoning ordinances which have been adopted in various political jurisdictions; and there is no reason to believe that similar situations would not arise in the implementation of policies of ad valorem property taxation with tax rates conditional upon land use.

#### 5.1.4 Legal Constraints and Political Acceptability

The judicial system requires that any taxation policy which is adopted by any political jurisdiction must apply uniformly to all entities which are subject to this taxation policy. In the context of a policy of ad valorem property taxation with tax rates conditional upon land use, this requirement essentially declares that any differences in the tax rates which are applied to different land use classifications must accurately reflect differences in either the demonstrable benefits obtained by society or the demonstrable costs imposed upon society by the

activities which are performed upon properties to which these land use classifications have been assigned. Thus, the political jurisdiction which adopts a taxation policy of this type must be prepared to defend its land use classification system in court on the basis of the validity of both the distinctions which this classification system makes between land use activities and the appropriateness of the tax rates which are employed with the various classifications.

Moreover, although it is impossible to make any strongly defensible statements concerning the near-term political acceptability of any of the land use control mechanisms which are investigated in this chapter in the absence of comprehensive attitudinal surveys of a representative sample of political jurisdictions (which have been precluded by the resource constraints of this project), it is possible to express some general impressions of the apparent prospects for the acceptance of a policy of ad valorem property taxation with tax rates conditional upon land use by individual political jurisdictions. Specifically, to the extent that this policy is similar to the existing property tax system and is considered to be a reasonable extension of this system by the constituents of these jurisdictions, it is more likely to be politically acceptable than many of the alternative policies which are evaluated in this chapter.

However, the adoption of this policy is unlikely to provide net benefits to all of these constituents. Rather, in general, it will provide net benefits to some of these individuals and will impose net costs upon others. Therefore, the overall political acceptability of the policy will be determined by the relative influence exerted by these groups within the political process. Yet, if, as is likely, the costs arising from the adoption of this policy will be concentrated upon a relatively small number of property owners, while the benefits will be relatively widely dispersed among the remainder of the constituents of the jurisdiction, the individuals who bear the costs will be much more strongly motivated to attempt to influence the political process than will the individuals who obtain the benefits, since the benefits which result from the adoption of the policy assume the properties of a public good for these individuals. Consequently, unless the individuals who support this policy can effectively coalesce their interests, it appears likely that those individuals who oppose the adoption of a policy of this type will exert more influence over the political process than the individuals who support the adoption of the policy. This relative imbalance of political influence may produce either a failure by the political system to adopt a policy of ad valorem property taxation

with tax rates conditional upon land use when the adoption of this policy would be socially desirable or, at least, the adoption of a system of tax rates which does not conform to the socially optimal system of tax rates.

#### 5.1.5 Expected Impact on Land Use Patterns

The impact which the adoption of a policy of ad valorem property taxation with tax rates conditional upon land use will exert upon the pattern of development in any area is essentially an empirical issue which cannot be resolved definitively solely on the basis of theoretical considerations. Specifically, for any land use activity, the effect of the adoption of this taxation policy upon the continued pursuit of this activity at its present location will be determined by the effect of the adoption of the policy upon the net returns which will be generated at this location by the existing land use activity and all alternative land use activities. If the adoption of the policy causes some alternative land use activity to produce net returns which exceed the net returns which will be earned by the present land use activity by more than the cost of discontinuing the present activity and initiating the alternative activity, the alternative activity will replace the present activity at this location. Yet, since the adoption of a policy of ad valorem taxation with tax rates conditional upon land use will impose substantially different total tax bills upon any particular parcel of land when different land use activities are pursued upon that parcel of land, it seems extremely likely that the implementation of this tax will induce substantial modifications in the land use pattern which has existed prior to the adoption of this policy. In particular, this policy should encourage the expanded development of those activities which, as a result of the policy, experience decreases in the external costs which they absorb which exceed the increases in the total tax bills which they incur; while it should encourage reductions in the pursuit of those activities which experience increases in their total tax bills which exceed the decreases in the external costs which they absorb.

Thus, it can be concluded that the adoption of a taxation policy of this type will induce the growth of some activities and discourage the growth of other activities. However, the net effect upon the overall growth rate of the entire community is generally indeterminate and cannot be predicted for any particular community without all of the detailed information which is required to develop and implement the socially optimal policy of ad valorem property taxation with tax rates conditional upon land use for that community.

## 5.2 Annual “Externality” Fees

For the payment of an annual “externality” fee to the government by the owner of the property on which an external effect is produced to be capable of exercising optimal control over the generation of externalities between private land uses, the fee which is imposed upon any parcel of land must be directly related to the volume of external effects which have been produced by the activity performed on this parcel during the preceding year. Specifically, the annual “externality” fee must be equal to the external costs incurred by the remainder of society which are attributable to the activity which has been performed upon this parcel during that year. If the fee is set at this level, the owner of this property will be compelled to recognize that he will be required to bear the full economic cost of any activity which he pursues on his property during any year either in the form of the direct internal costs which he incurs as he performs this activity or in the form of the fee which he pays to the government at the end of the year during which he performs this activity. Consequently, he will incorporate both of these elements of cost into each decision which he makes concerning the utilization of his property and, hence, will pursue the socially optimal utilization of this property.

However, the implementation in any single year of a system of annual “externality” fees which fulfills these conditions for each parcel of land to which this system is applied will require, in general, the identification of the portion of the total volume of external effects absorbed by each member of society which is attributable to the activity performed on each of these parcels during this year and, then, the measurement of the external costs incurred by each of these individuals as a result of his absorbing this amount of external effects during this year. Obviously, the accurate monitoring of the quantity of external effects which are absorbed by each member of society from each source of external effects during any year will, at least, be extremely expensive. In fact, if individual members of society absorb the same type of external effect (e.g., air, water, or noise pollution) from several different sources simultaneously, the identification of the portion of the total volume of this external effect which each of these individuals absorbs from each of these sources may be technically impossible. Moreover, even if the volume of external effects which each individual absorbs from each source can be identified, the accurate estimation of the external costs which this individual incurs from his absorbing these external effects will be extremely difficult, if not theoretically impossible, for the reasons discussed in detail in Section 5.1.2.



Finally, the implementation of a system of annual “externality” fees which is capable of unambiguously promoting the attainment of the socially optimal land use pattern requires the repetition of this identification and measurement process on an annual basis. Therefore, it appears virtually inevitable that the implementation of that system of annual “externality” fees which is theoretically optimal when all of the information required for the development and administration of this system is available at no cost will prove to be both prohibitively expensive and technically infeasible when the difficulty and cost of obtaining this information is taken into consideration.

Yet, a demonstration of the general social undesirability of implementing this particular system of annual “externality” fees does not constitute a demonstration of the social undesirability of implementing any system of annual “externality” fees. Rather, it is entirely possible that it might be socially desirable to develop and implement a system of annual “externality” fees which consists of, first, an exhaustive set of mutually exclusive land use classifications such that the external costs which are attributable to the performance of all activities to which any single classification is assigned are reasonably similar, while the external costs which are attributable to the performance of activities to which different classifications are assigned are demonstrably different; and, second, for each of these land use classifications, a standard annual “externality” fee which is imposed upon each property to which the classification is assigned. Consequently, the remainder of this section is devoted to an investigation of the properties of a system of annual “externality” fees of this type.

#### 5.2.1 Expected Deviations from Social Optimality

Under any system of annual “externality” fees of this type, the fee which is imposed upon any parcel of land is unchanged by any modification of the activity performed upon this parcel of land which does not precipitate a change in the land use classification which is applicable to this parcel. Thus, this system of annual “externality” fees provides no incentives for any property owner to reduce the generation of adverse external effects by the activity performed on his property when this action will not shift this property into a different land use classification with a lower “externality” fee. Similarly, this system provides no disincentives for any property owner to increase the generation of adverse external effects by the activity performed on his property when this action will not shift this property into a different

land use classification with a higher “externality” fee. Therefore, to the extent that increasing the generation of adverse external effects upon any property is consistent with increasing the profits which are earned by the activity performed on this property (or, equivalently, to the extent that controlling the generation of adverse external effects upon any property requires the accepting of a reduction in the profits which are earned by the activity performed on this property), it can reasonably be expected that, within any land use classification, the quantity of adverse external effects generated by the activity performed on any parcel of land to which this classification is assigned will tend to converge upon the maximum quantity of adverse external effects which can be generated by the activity performed on this parcel without precipitating the assignment to this parcel of a land use classification with a higher “externality” fee.

The severity of this bias in the incentives which are provided by this system of annual “externality” fees can be reduced to some extent by creating a more detailed structure of land use classifications and, then, employing different annual “externality” fees with each of these more detailed classifications. Yet, there inevitably will remain, for many properties within any land use classification which ultimately is delineated, a disincentive to initiate any reductions in the generation of adverse external effects upon these properties which will not shift the properties into different land use classifications with lower “externality” fees. In addition, any increase in the number of land use classifications which are employed in a system of annual “externality” fees will cause an increase in the difficulty and, hence, the cost of monitoring the continuing compliance of the activity performed upon each property with the stipulations of the land use classification to which this property is assigned at each point in time. The greater is the number of land use classifications which are delineated, the greater will be the frequency with which a modification of the activity performed on a property will precipitate a change in the land use classification which should be assigned to this property, and the more subtle will be the modifications of the activities performed upon parcels of land which will precipitate changes in the land use classifications assigned to these parcels of land. Therefore, increasing the number of land use classifications which are delineated in a system of annual “externality” fees will increase the optimal frequency of monitoring, the optimal sophistication of monitoring, and, hence, the cost of monitoring. Consequently, in attempting to identify the most socially desirable classification of land use for a system of annual “externality” fees, it will be necessary to balance the relatively large deviations from the socially optimal

pattern of development which will be associated with the delineation of only a relatively small number of land use classifications against the relatively high monitoring costs which will be associated with the delineation of a relatively large number of classifications.

#### 5.2.2 Information Requirements and Information Retrieval Considerations

The development of a potentially socially desirable system of annual "externality" fees requires the delineation of an acceptable system of land use classifications and the determination of the appropriate annual "externality" fee to employ with each of these classifications. To delineate an acceptable system of land use classifications, it is necessary, first, to identify mutually exclusive groups of properties such that the external costs which are attributable to the activity performed upon each property within a particular group is reasonably constant, while the external costs which are attributable to the activities performed on properties within different groups are demonstrably different. Then, those attributes of properties which distinguish the properties in each of these groups from the properties assigned to the other groups must be isolated. To perform these tasks, it is necessary to obtain data which specify, for at least a representative sample of the properties upon which annual "externality" fees will be imposed, the external costs which are attributable to the activity which is performed on each property in the sample and the attributes of this property which might distinguish it from properties to which different land use classifications are likely to be assigned.

The technical and motivational problems in the provision of reasonably accurate estimates of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2 in the context of the development of a policy of ad valorem property taxation with tax rates conditional upon land use will also prevail in the development of any system of annual "externality" fees. Consequently, once again, the estimates of external costs which will be obtainable for the delineation of an acceptable system of land use classifications will necessarily be relatively crude. Nevertheless, on the basis of these estimates, it should be possible to separate the properties in the representative sample into mutually exclusive groups which fulfill the conditions specified in the preceding paragraph.

After these mutually exclusive groups of properties have been produced, it will be necessary to identify those attributes of the properties within any particular group which distinguish these properties from the properties in the remaining groups. In general, it seems reasonable to expect that the attributes of the activity performed upon any parcel of land which will provide these distinctions will be related to those characteristics of this activity which determine the level of external costs which are attributable to its performance. Thus, to the extent that the level of external costs which are attributable to the performance of any particular activity on any parcel of land is affected by the volume of external effects which are generated by this activity and to the extent that this volume of external effects can be measured at acceptable levels of cost using technically feasible monitoring technology, the volume of external effects generated by the activity performed on the various properties in the sample should constitute an appropriate attribute to distinguish among the properties in the different groups. Similarly, to the extent that the level of external costs which are attributable to the performance of any activity on any parcel of land is affected by the characteristics of the properties -- and the activities performed upon the properties -- which incur these external costs, these characteristics of these properties should constitute reasonable attributes to distinguish among the properties in the different groups.

Thus, if the initiation of an industrial activity in an existing residential neighborhood will generate higher external costs than the initiation of this same industrial activity in an existing industrial neighborhood, the characteristics of the neighborhood in which an industrial activity is located should constitute an appropriate attribute to distinguish among the properties in some of the groups which have been identified. Similarly, if the initiation of residential land uses can impose external costs upon properties containing existing industrial activities by locating in the neighborhood of these activities and, hence, increasing the level of external costs which this industrial activity imposes upon the remainder of society (and for which this industrial activity is charged under the prevailing system of annual "externality" fees) for any volume of external effects which this industrial activity generates, the characteristics of the neighborhood in which a residential activity is located should also constitute an appropriate attribute to distinguish among the properties in different groups.\*

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\*Observe that this analysis implies that in any neighborhood containing a mixture of industrial and residential activities, positive annual "externality" fee should be imposed upon both properties upon which industrial activities are performed and properties upon which residential activities are pursued.

In general, a substantial amount of this desired information concerning the attributes of each of the properties in the representative sample can be obtained from existing land use and municipal zoning records. Yet, almost invariably, it will be necessary to produce some portion of this desired information through direct observation and inspection of these properties.

Nevertheless, after all of the desired information concerning the attributes of the properties in the representative sample has been assembled, it should be possible to develop a set of criteria which will permit the determination of the appropriate land use classification to assign to each parcel of land upon which an annual "externality" fee will be imposed by carefully comparing the attributes of all of the properties in each of the mutually exclusive groups of properties which have been identified to the attributes of all of the properties in each of the other mutually exclusive groups. Moreover, the annual "externality" fee which should be imposed upon each property to which any particular land use classification is assigned can be set at a level equal to the estimated external costs attributable to the activity performed upon each of the properties in the representative sample which are included in the mutually exclusive group associated with this land use classification.

However, to determine the land use classification which should be assigned to each of the properties upon which an annual "externality" fee will be imposed which is not included in the representative sample, it will be necessary to gather information describing those attributes of each of these properties which correspond to the attributes of the properties in the representative sample which have been utilized to define the set of criteria which distinguish among the various land use classifications. Moreover, to identify those instances in which modifications in the activities which are performed on parcels of land should be accompanied by changes in the land use classifications and annual "externality" fees which are applied to these properties, it will also be necessary to monitor continually these attributes of each property to which this policy is applied. Finally, to validate and, when necessary, adjust the system of land use classifications and the annual "externality" fee to employ with each of these classifications, it will be desirable periodically to produce revised estimates of the external costs which are attributable to the activities which are performed on a representative sample of these properties.

After this information has been accumulated, the information retrieval capabilities which are required for the implementation of a system of annual "externality" fees is relatively modest. Specifically, it is necessary merely to create one data file specifying the land use classification which is applicable to each parcel of land upon which an annual "externality" fee will be imposed and another data file specifying the annual "externality" fee which is employed with each land use classification. Then, to determine the annual "externality" fee which is applicable to any property at any point in time, the agency responsible for the administration of this system must only extract the land use classification of this property from the first data file and, subsequently, to retrieve the annual "externality" fee which is employed with this land use classification from the second data file. Moreover, to produce the appropriate change in the annual "externality" fee which is imposed upon any parcel in response to a modification of the activity performed on this parcel, it is necessary merely to replace the existing land use classification specified for this property in the first data file with the land use classification which is applicable to the modified activity which is presently being performed on this property.

#### 5.2.3 Potential Inequities, Abuses, and Enforcement Problems

For the most part, the potential inequities and abuses which are likely to arise under a system of annual "externality" fees are essentially the same as the potential inequities and abuses which are likely to arise under a policy of ad valorem property taxation with tax rates conditional upon land use. Thus, since the annual "externality" fee which is imposed upon any property is determined by the land use classification which is assigned to the property, the intentional or unintentional assignment of inappropriate land use classifications to parcels of land will produce inequities in the treatment of different property owners. In addition, since the external costs which are attributable to the performance of any particular activity in any particular situation is unlikely to be measurable with sufficient accuracy to constitute a strongly defensible basis for the determination of the appropriate annual "externality" fee to employ with each land use classification, it is highly probable that the annual "externality" fees which actually are employed will be influenced to some extent by the political process.

In particular, it is likely that the annual "externality" fees which are employed with land use classifications incorporating activities performed by individuals exerting substantial political influence will be

set at levels which are lower than the socially optimal fees, while the annual "externality" fees which are employed with land use classifications incorporating activities performed by individuals exerting relatively little political influence may be set at levels which are higher than the socially optimal fees. Moreover, since the establishment of inappropriate annual "externality" fees for particular land use classifications and the assignment of inappropriate land use classifications to particular parcels of land will directly affect the wealth of the owners of properties to which these inappropriate fees and classifications are applied, motivations will exist for these property owners to offer bribes to public officials for the preferential assignment of land use classifications and the preferential establishment of annual "externality" fees.

Finally, inequities in the treatment of different property owners can be produced by the inconsistent monitoring of the activities which are performed upon various parcels of land. Once again, inequities will arise between property owners whose modifications of activity are detected immediately after the modifications are performed and property owners whose modifications of activity are not detected until a substantial period of time has elapsed after the initiation of the modifications. However, the prospect of these inequities does not imply that all properties should be subjected to the same intensity of monitoring. Rather, the socially desirable intensity of monitoring of each parcel of land should be determined on the basis of both the expected probability that the activity performed upon this parcel will be modified in a manner which will precipitate a change in the land use classification which is applicable to this parcel and the magnitude of the change in external costs which can be expected to be produced by any modification of activity which is initiated on this parcel.

Nevertheless, it is imperative that a reasonable degree of intensity must be exercised in the monitoring of the activity performed upon each parcel of land upon which an annual "externality" fee is imposed. If the monitoring of the continuing compliance of the activity performed upon any parcel of land with the stipulations of the land use classification assigned to this parcel of land becomes so ineffectual that the owner of this property can reasonably assume that modifications of the activity which he performs upon his property will have no effect upon the land use classification or, hence, the annual externality fee which is assigned to this property, the property owner rationally will regard the annual "externality" fee to be a lump-sum tax -- a tax whose magnitude remains constant regardless of the activity which is performed

upon the property. If this situation arises, the annual “externality” fee will exert no influence upon either the activity which is performed upon the property or the external costs which are attributable to the performance of this activity. Consequently, the effectiveness of any system of annual “externality” fees in promoting the attainment of the socially optimal pattern of development will be strongly influenced by the diligence and accuracy of the monitoring procedures which are established to administer the implementation of this system.

#### 5.2.4 Legal Constraints and Political Acceptability

As in the case of a policy of ad valorem property taxation with tax rates conditional upon land use, the judicial system requires that any system of annual “externality” fees which is adopted by any political jurisdiction must apply uniformly to all entities which are subject to this system of fees. Essentially, this requirement declares that any differences in the annual “externality” fees which are employed with different land use classifications must accurately reflect differences in the demonstrable external costs imposed upon society by the activities which are performed upon properties to which these land use classifications have been assigned. Thus, any political jurisdiction which adopts a system of annual “externality” fees must be prepared to defend in court both the validity of the distinctions which the land use classification structure embodied in this system of annual “externality” fees makes between different land use activities and the appropriateness of the annual externality fees which are employed with the various land use classifications in this structure.

In addition to fulfilling these legal requirements, a system of annual “externality” fees must be politically acceptable within a jurisdiction before this jurisdiction will adopt the system. To the extent that this system is considered to be similar to existing fee or licensing mechanisms by the constituents of this jurisdiction, it is reasonably likely to be regarded as acceptable by these constituents. However, to the extent that these individuals view the system of annual “externality” fees as a unique and unprecedented taxation mechanism, its political acceptance by these constituents undoubtedly will require the exertion of considerable public relations efforts by its proponents.

Moreover, since any realistic system of annual “externality” fees will not provide positive net benefits to all of the constituents of the jurisdiction which is considering the adoption of a fee system, the



political acceptability of any system of fees will be determined to some extent by the relative political influence of those constituents who obtain net benefits from its adoption and those constituents who incur net costs as a result of its adoption. Finally, to the extent that there is general political resistance to the adoption of any policy which increases taxes, the political acceptability of the initiation of any system of annual "externality" fees will be greater if the proposal to adopt this system is accompanied by a proposal to reduce other taxes than if the proposal to adopt the system is introduced in isolation.

#### 5.2.5 Expected Impacts on Land Use Patterns

The impact of the adoption of a system of annual "externality" fees upon the pattern of development in any area is inevitably an empirical issue which cannot be resolved definitively solely on the basis of theoretical considerations. To the extent that the adoption of any system of this type increases the total cost of performing any particular land use activity above the cost which would have prevailed in the absence of the system, the adoption of the system will discourage the performance of this land use activity. Conversely, to the extent that the adoption of the system decreases the total cost of performing any particular land use activity (including the external costs absorbed by the activity) below the cost which would have prevailed in the absence of the system, the adoption of the system will encourage the performance of this land use activity. Any system of annual "externality" fees can be expected to produce the first type of effect in some instances and the second type of effect in other instances. Thus, the net effect of the adoption of any system of this type upon the overall growth rate of the community is generally indeterminate.

Yet, since any system of annual "externality" fees will impose substantially different fees upon any parcel of land when different land use activities are performed upon this parcel of land and since the initial application of a system of fees in any jurisdiction will significantly affect the net returns which can be earned on any parcel of land, the adoption of any system of this type in any jurisdiction can be expected to induce substantial modifications in the land use pattern which has existed in this jurisdiction prior to the adoption of the system of fees. In addition, the grosser are the distinctions between the types of land use activities to which different land use classifications are applied and the greater are the differences between the annual "externality" fees which are employed with different land use classifications, the less frequent will be the occurrence of modifications in

land use activities which precipitate changes in the land use classifications assigned to parcels of land which produce increases in the annual "externality" fee imposed on these parcels and, hence, the greater will be stability of those land use activities whose modification will generate these effects. Moreover, since these incentives will exist to some extent with any system of annual "externality" fees, any system of this type will increase the temporal stability of those land use activities whose modification will produce increases in the annual "externality" fees imposed upon the parcels containing these activities.

### 5.3 Lump-Sum Payment for Externalities Prior to Change in Permissible Land Use Status

For a lump-sum payment for externalities which is exacted only in the event of a change in the zoning or permissible land use status of any parcel of land to be capable of exercising optimal control over the generation of externalities between private land uses, the payment which is applied to any property owner when he proposes a change in the zoning or permissible land use status of his property must be set equal to the discounted present value of the difference between the external costs which the performance of the proposed land use activity on this property will impose upon all other members of society during each year in the future and the external costs which the continued performance of the land use activity presently pursued on this property will impose upon these same individuals during each of these years when the socially optimal allocation of all other resources is attained in each of these years. If the payment is set at this level, each property owner will be required to recognize and absorb, prior to initiating upon his property any new land use activity which will require a change in zoning or other administrative approval, the total incremental costs which will be incurred by all members of society (i.e., both changes in his own internal costs and changes in the external costs absorbed by the remainder of society) if the new activity is introduced. Consequently, a property owner will not choose to initiate any new land use activity on his property unless the future benefits which he expects to obtain from the performance of this activity exceed the total future costs which all members of society expect to incur if this activity is performed on this property; and, hence, he will pursue the socially optimal utilization of his property.

Clearly, if lump-sum payments for externalities are to encourage appropriately the initiation of new land use activities which will produce decreases in the discounted present value of the external costs which are attributable to the activities which are performed upon particular parcels of land, the payments for externalities must flow from the government to the owners of these properties (i.e., subsidies must be paid to property owners) in these instances. Conversely, if these payments are to discourage appropriately the initiation of new land use activities which will generate increases in the discounted present value of these external costs, the payments must flow from property owners to the government (i.e., fees must be paid to the government).

In addition, since lump-sum payments for externalities must be made only when designated events occur (e.g., the approval of an application for a change in the zoning or the permissible land use status of a property), the unambiguous promotion of the attainment of social optimality through the application of payments of this type requires that a designated event must occur whenever a modification of the activity which is performed upon any parcel of land changes the discounted present value of the external costs which are attributable to the activity performed on that parcel. Thus, for example, requiring a lump-sum payment for externalities on each occasion when a change in zoning is approved will unambiguously promote the attainment of social optimality only if a change in zoning is required in every instance in which a change in the activity performed on a parcel of land will change the discounted present value of the external costs which are incurred by society. For this condition to be fulfilled, the land use classifications delineated in the existing municipal zoning ordinance must constitute an exhaustive set of mutually exclusive land use classifications such that the discounted present value of the external costs which are attributable to the performance of all of the activities included within any single classification are identical, while the discounted present value of the external costs which are attributable to the performance of activities included in different classifications may be demonstrably different.

Ostensibly, the land use classifications which are delineated within any municipal zoning ordinance should exhibit precisely these properties. However, the frequent occurrence of attempts by zoning administrators and concerned citizens to impose, upon property owners requesting changes in zoning, constraints which would permit these property owners to pursue upon their properties only a subset of the land use activities which are generally permissible on properties to which the requested land use classifications are applied strongly

implies that these zoning administrators and concerned citizens do not believe that the external costs which are attributable to the various activities whose performance is permitted within any of these land use classifications are identical. To the extent that the objections of these individuals are justified, the promotion of the attainment of social optimality through the imposition of lump-sum payments for externalities will necessitate the making of lump-sum payments in many situations in which changes in zoning are not presently required.

Consequently, if the theoretically optimal control of the generation of externalities between private land uses is desired, it will be necessary, in general, to develop a new land use classification system such that the discounted present value of the external costs which are attributable to the performance of all of the activities included within any single classification are identical and, then, to require that any modification of the activity performed on any parcel of land which precipitates a change in the land use classification which is applicable to the parcel must be formally approved by the agency which is responsible for the collection or dispensation of the lump-sum payments.\*

However, the implementation of a system of lump-sum payments for externalities which fulfills these conditions for each parcel of land to which this system is applied will, in general, be socially undesirable. In particular, the collection or dispensation of lump-sum payments for externalities will, in numerous instances involving minor modifications of activities, require the agency which is responsible for the administration of this system to incur costs in processing requests for changes in permissible land use status, performing the

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\*Clearly, if the lump-sum payments which are required when a modification of activity is initiated are set appropriately, there will be no justification for denying any request for a change in permissible land use status. Hence, the approval of any request for a change in permissible land use status should be automatic and should merely serve the purpose of requiring each property owner to reveal to the administrative agency the need for a lump-sum payment. However, since this payment frequently will flow from the property owner to the government, some penalty for failing to report a modification of land use activity to this administrative agency should be established to overcome the obvious disincentive for any property owner to report those modifications of this activity which will require him to make a payment to the government.

collection or dispensation of payments, and monitoring the occurrence of these minor modifications of activities which substantially exceed the benefits which are obtained by society from the minor improvements in the prevailing pattern of development which are induced by these efforts. Therefore, instead of developing and implementing a system of lump-sum payments for externalities which collects or dispenses a payment in every instance in which a modification of the activity which is performed on any parcel of land generates a change in the discounted present value of the external costs which are attributable to the activity performed on the parcel of land, it generally will be more socially desirable to develop and implement a system of payments in which an appropriate balance has been established between the incremental costs which will be incurred by society if no lump-sum payments are provided for certain modifications of activity which generate changes in external costs and the incremental costs which will be incurred by the administrative agency if lump-sum payments are provided for these modifications of activity.

Essentially, a system of this type will consist of, first, an exhaustive set of mutually exclusive land use classifications such that the external costs which are attributable to the performance of all activities to which any single classification is assigned are reasonably similar while the external costs which are attributable to the performance of activities to which different classifications are assigned are demonstrably different; and, second, for each combination of two different land use classifications, a standard lump-sum payment which is collected from or dispensed to any property owner who initiates a modification of the activity performed on his property which changes the land use classification which is applicable to this property from the first of these two classifications to the second of these classifications. The remainder of this section is devoted to an analysis of the properties of a system of lump-sum payments for externalities of this type.

#### 5.3.1 Expected Deviations from Social Optimality

Under a system of lump-sum payments for externalities of this type, no payment is collected from or dispensed to any property owner in response to a modification of the activity performed on his property if this modification of activity does not precipitate a change in the land use classification which is applicable to this property. Therefore, any system of this type will fail to provide any incentive for any property owner to initiate any modification of the activity performed on his

property which reduces the external costs incurred by the remainder of society when this modification of activity will not generate a change in the land use classification assigned to the property for which he will be paid a subsidy. Similarly, it will fail to provide any disincentive for any property owner to introduce any modification of the activity performed on his property which increases the external costs incurred by the remainder of society when this modification of activity will not produce a change in the land use classification assigned to the property for which he will be compelled to make a payment to the government. Consequently, to the extent that reducing the level of external costs which are attributable to the performance of any activity requires the accepting of a reduction in the profits which are generated by the activity (and, hence, to the extent that increasing the level of external costs which are attributable to the performance of any activity is consistent with increasing the profits which are generated by the activity), it can reasonably be expected that the level of external costs which are attributable to the activity performed upon any parcel of land to which any particular land use classification is assigned will tend to converge upon the maximum level of external costs which can be generated by the activity without precipitating a change in the land use classification assigned to this parcel of land for which the owner of the parcel will be required to make a lump-sum payment to the government.

The severity of the bias in the incentives which are provided by this system of lump-sum externality payments can be reduced to some extent by delineating a more detailed structure of land use classifications and associated lump-sum payments. Yet, there inevitably will remain, for many properties within each land use classification which ultimately is delineated, a disincentive to initiate any modifications of activity which will reduce the generation of external costs but will fail to precipitate changes in the land use classifications applied to these properties for which subsidies will be paid to the owners of the properties. In addition, any increase in the number of land use classifications which are employed in a system of lump-sum payments for externalities will cause an increase in the difficulty and the cost of monitoring the continuing compliance of the activity performed upon each property with the stipulations of the land use classification to which the property is assigned at each point in time. Consequently, in attempting to delineate the most socially desirable classification of land uses for a system of this type, it will be necessary to balance the substantial deviations from the socially optimal pattern of development which arise when only a small number of land use classifications are defined against the considerable monitoring costs which prevail when a large number of land use classifications are specified.

### 5.3.2 Information Requirements and Information Retrieval Considerations

The development of a potentially socially desirable system of lump-sum payments for externalities requires the delineation of an acceptable system of land use classifications and the determination of the appropriate lump-sum payment to employ with each possible change in land use classifications. To delineate an acceptable system of land use classifications, it is necessary, first, to identify mutually exclusive groups of properties such that the discounted present value of the external costs which will be imposed upon society during each year in the future by the activity presently performed upon each property in any particular group when the socially optimal allocation of all other resources is attained in each of these years is reasonably constant, while the discounted present value of the external costs which will be imposed upon society during each of these years by the activities presently performed on properties within different groups under these same circumstances are demonstrably different. Then, those attributes of properties which distinguish the properties in each of these groups from the properties assigned to the other groups must be isolated.

To perform these tasks, it is necessary to obtain data which specify, for at least a representative sample of the properties to which the system of lump-sum payments for externalities will be applied, both the external costs which will be attributable to the activity which is presently performed on each property in the sample during each year in the future when the socially optimal allocation of all other resources is attained in each of these years and the attributes of this property which might distinguish it from properties to which different land use classifications are likely to be assigned. In addition, the determination of these external costs for any property requires the identification of the socially optimal allocation of all other resources in each year in the future and, then, the measurement of the external costs which will be incurred by all other members of society as a result of the activity performed on this property when these allocations of resources prevail in each of these years. Finally, to permit the calculation of the discounted present value of these external costs, it will be necessary to determine the appropriate interest rate at which these external costs should be discounted.

However, the identification of the socially optimal allocation of resources in any single year requires knowledge of both the supply of, and the demand for, each good in the economy in this year and any

imperfections (e.g., externality, public good, or natural monopoly problems) which exist in the market for any of these goods in this year. The obtaining of reasonably accurate information concerning these topics for even the current year constitutes an extremely difficult task; and the obtaining of reasonably accurate forecasts of this information for years in the increasingly distant future is even more difficult.

Moreover, even if acceptable forecasts of the socially optimal allocation of resources can be generated for each year in the future, the estimation of the external costs which the activity performed on each parcel in the representative sample will impose upon the remainder of society during each year in the future if the forecasted allocation of resources prevails in each of these years will inevitably encounter substantial problems. In particular, the technical and motivational problems in the estimation of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2 will prevail once again in the development of a system of lump-sum payments for externalities. Consequently, the estimates of external costs which are obtainable for even the current year will necessarily be relatively crude. Moreover, because any individual's estimate of his willingness to pay for the control of externalities becomes more speculative as the time period for which this estimate is produced lies further in the future (indeed the determination of the identities or, even, the characteristics of the individuals who will be affected by these externalities becomes more speculative as the time period for which this determination is performed lies further in the future), the estimates of external costs which will be obtainable for years in the increasingly distant future will undoubtedly be even less reliable than the estimates which are obtainable for the current year.

Yet, the process through which the calculation of the discounted present value of these external costs is performed attaches monotonically decreasing weights to external costs which are incurred in the increasingly distant future. Therefore, the impact upon the estimated discounted present value of these external costs of an error of any particular magnitude in the estimated value of the external costs incurred in any particular year will diminish as the year for which this error in measurement occurs lies further in the future. Nevertheless, these errors of measurement will adversely affect the appropriateness of the payments which are made under a system of lump-sum payments for externalities relative to the appropriateness of the payments which are made under any policy whose tax or fee structure is determined solely on the basis of cost and benefit estimates for the current time period.



Finally, even if acceptable estimates of the external costs which will be attributable to the activity which is presently performed on each property in the sample can be provided for each year in the future, the problem of identifying the appropriate interest rate at which to discount these external costs remains. Theoretically, for each individual who incurs external costs, this interest rate should be equal to the rate of interest at which this individual is able to borrow or lend in the market.\* However, since there exists no single interest rate at which all individuals can borrow and lend in the market, it will be necessary to employ an average of the various interest rates which prevail in the market during the year as an estimate of the appropriate interest rate to use in the discounting of external costs for that year. Obviously, since the years for which external costs must be discounted to calculate the desired present value all lie in the future, imperfect forecasts of these average market interest rates will have to be utilized in this discounting process.

Recognizing all of these empirical and theoretical difficulties associated with obtaining the basic information required for the estimation of the discounted present value of the external costs which will be imposed upon society during each year in the future by the activity presently performed upon each property in the representative sample when the socially optimal allocation of all other resources is attained in each of these years, it is obvious that any system of lump-sum payments for externalities will be forced to rely upon relatively crude approximations of the true discounted present values of these external costs in its formulation. Nevertheless, on the basis of these approximations, it should be possible to separate the properties in the representative sample into mutually exclusive groups such that the estimated discounted present value of these external costs is reasonably constant for each property within each group, but is noticeably different for properties within different groups.

After these mutually exclusive groups have been produced, it will be necessary to identify those attributes of the properties within any particular group which distinguish these properties from the properties in the remaining groups. Once again, it seems reasonable to expect that the attributes of the activity performed upon any parcel of land which will provide these distinctions will be related to those characteristics of this activity which determine the level of external costs

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\*See Hirshliefer (51).

which are attributable to its performance. Moreover, once again, a substantial portion of the information concerning these attributes undoubtedly can be obtained for each of the properties in the representative sample from existing land use and municipal zoning records: while obtaining the remainder of this desired information invariably will require direct observation and inspection of these properties.

Yet, after all of this information has been assembled, it should be possible to develop a set of criteria which will permit the determination of the appropriate land use classification to assign to each property to which a lump-sum payment for externalities might be applied by carefully comparing the attributes of all of the properties in each of the mutually exclusive groups of properties which have been identified to the attributes of all of the properties in each of the other mutually exclusive groups. Moreover, the lump-sum payment which should be applied to each parcel of land for which a modification of activity has been proposed which will cause the land use classification assigned to the parcel to change from any particular classification to any other particular classification can be set equal to the difference between the estimated discounted present value of the external costs attributable to the activity performed upon each of the properties in the representative sample which are included in the mutually exclusive group associated with the proposed classification of the parcel and the estimated discounted present value of the external costs attributable to the activity performed upon each of the properties in the sample which are included in the group associated with the initial classification of the parcel. If this difference is positive, the lump-sum payment for externalities must flow from the owner of the parcel of land to the government (i.e., a fee must be paid to the government); while if this difference is negative, the payment should flow in the opposite direction (i.e., a subsidy must be paid to the property owner).

Then, to determine the land use classification which should be assigned to each of the properties to which a lump-sum payment for externalities might be applied which is not included in the representative sample, it will be necessary to assemble information describing those attributes of each of these properties which correspond to the attributes of the properties in the representative sample which have been utilized to define the set of criteria which distinguish among the various land use classifications. In addition, to identify those instances in which modifications in the activities which are performed on parcels of land should be accompanied by changes in the land use classifications which are applied to these properties and the collection or dispensation

of lump-sum payments, it will also be necessary to monitor continually these attributes of each property to which a lump-sum payment might be applied. Finally, to substantiate and, when necessary, adjust the structure of land use classifications and the lump-sum payments to employ for changes in these classifications, it will be desirable periodically to produce revised estimates of the external costs which are attributable to the activities performed on a representative sample of these properties during each year in the future.

After all of this information has been assembled, the information retrieval requirements for the implementation of a system of lump-sum payments for externalities is modest. In particular, it is necessary to create only two data files: one specifying the current land use classification which is applicable to each parcel of land to which a lump-sum payment for externalities might be applied and one specifying the lump-sum payment which will be applied to each parcel of land on which a modification of activity is initiated which will cause the land use classification assigned to the parcel to change from any one particular classification to any other particular classification. Then, to determine the lump-sum payment which is applicable to any parcel of land when the activity performed on the property is appropriately modified, the agency responsible for the administration of this system must merely extract the current land use classification of the property from the first data file and, subsequently, to retrieve the lump-sum payment for externalities associated with this initial land use classification and the proposed land use classification of the property from the second data file. Finally, to update the first data file after the land use classification assigned to any property has been changed, it is necessary merely to replace the initial land use classification specified for the property in this file with the land use classification which is applicable to the property after the activity performed on the property has been modified.

### 5.3.3 Potential Inequities, Abuses, and Enforcement Problems

To a large extent, the potential inequities and abuses which are likely to arise under a system of lump-sum payments for externalities are very similar to the potential inequities and abuses which are likely to arise under either a policy of ad valorem property taxation with tax rates conditional upon land use or a system of annual "externality" fees. Thus, since the lump-sum payment which is applied to a parcel of land on which a modification of activity has been initiated is determined by both the land use classification assigned to the property prior

to the modification of activity and the land use classification assigned to the property after the modification of activity, the intentional or unintentional assignment of inappropriate land use classifications to parcels of land either initially or subsequent to modifications of the activities performed upon these parcels will produce inequities in the treatment of different property owners.

In addition, since the discounted present value of the external costs which are attributable to the performance of any particular activity in any particular situation is unlikely to be measurable with sufficient accuracy to constitute an incontestable basis for the determination of the appropriate lump-sum payment to be applied to each possible change in land use classifications, it is extremely likely that the lump-sum payments which actually are applied will be influenced to some extent by the political process. Specifically, it is probable that the lump-sum payments which are applied to changes in land use classifications which benefit individuals who exert substantial political influence will be set at levels which are lower than the socially optimal levels (i.e., either an undesirably low fee or an undesirably high subsidy will be applied to these changes in land use classifications); while the lump-sum payments which are applied to changes in land use classifications which benefit individuals who exert little political influence may be set at levels which are higher than the socially optimal levels. Moreover, since the establishment of inappropriate lump-sum payments for externalities for particular changes in land use classifications and the assignment of inappropriate land use classifications to particular parcels of land will directly affect the wealth of the owners of properties to which these inappropriate payments and classifications are applied, motivations will exist for these property owners to offer bribes to public officials to obtain preferential assignments of land use classifications and the preferential specification of lump-sum payments for externalities.

Inequities in the treatment of different property owners can also be produced by the inconsistent monitoring of the activities which are performed upon various parcels of land. Although, formally, a system of lump-sum payments for externalities requires each property owner who intends to initiate a modification of the activity performed on his property which will precipitate a change in the land use classification applicable to the property to obtain the approval of the agency responsible for the administration of the system prior to initiating this modification of activity, property owners who intend to initiate modifications of activity which will require them to make a lump-sum payment

to the government obviously have an incentive to refrain from informing this administrative agency of their intentions. To suppress this incentive, it will be necessary both to establish and enforce a substantial fine for failure to obtain approval for a modification of activity which entails a change in land use classification and to monitor the activity performed upon each parcel of land to which a lump-sum payment for externalities might be applied to determine those situations in which a fine should be levied. Yet, inequities will still arise between either property owners who obtain administrative approval prior to initiating modifications of activity or property owners whose unapproved modifications of activity are detected immediately after the modifications are performed and property owners whose unapproved modifications of activity are not detected until a substantial period of time has elapsed after the initiation of these modifications. Consequently, it is imperative that a reasonable degree of intensity must be exercised in the monitoring of the activity performed upon each parcel of land to which a lump-sum payment for externalities might be applied.

Although all of these Inequities, abuses, and enforcement problems which might arise under a system of lump-sum payments for externalities are extremely similar to the inequities, abuses, and enforcement problems which might arise under either a policy of ad valorem property taxation with tax rates conditional upon land use or a system of annual "externality" fees, it is important to recognize one critical difference between the likely implications of these potential inequities, abuses, and enforcement problems for the attainment of social optimality when these different mechanisms for the control of externalities are employed. Since both a policy of ad valorem property taxation with tax rates conditional upon land uses and a system of annual "externality" fees compels the payment of charges by property owners on a regular periodic (i.e., annual) basis, the possibility of adjusting these charges to correct for errors in estimation is relatively great when these mechanisms are employed. Conversely, since a system of lump-sum payments for externalities requires the payment of fees by property owners or subsidies to property owners only on those relatively infrequent occasions when modifications of activity are initiated which entail changes in land use classifications, the probability of recognizing the social desirability of adjusting these payments to correct for errors in estimation are relatively low and, hence, the prospect of converging upon the most socially desirable system of lump-sum payments for externalities is relatively limited.

#### 5.3.4 Legal Constraints and Political Acceptability

As with either a policy of ad valorem property taxation with tax rates conditional upon land uses or a system of annual “externality” fees, the judicial system requires that any system of lump-sum payments for externalities which is adopted by any political jurisdiction must apply uniformly to all entities to which this system of payments might be applied. Essentially, this requirement states that any differences in the lump-sum payments for externalities which are employed with different changes in land use classifications must accurately reflect differences in the changes in the discounted present values of demonstrable external costs which are attributable to the modifications of activity which are associated with these changes in land use classifications. Therefore, any political jurisdiction which adopts a system of lump-sum payments for externalities must be prepared to defend in court both the validity of the distinctions which the land use classification structure embodied within this system of lump-sum payments makes between different land use activities and the appropriateness of the lump-sum payments which are employed with the various changes in land use classification which are possible within this structure.

In addition to fulfilling these legal requirements, a system of lump-sum payments for externalities must be politically acceptable within a jurisdiction before this justification will adopt the system. To the extent that the system is regarded by the constituents of the jurisdiction as similar to existing fee or licensing mechanisms, it is reasonably likely to be considered to be acceptable by these constituents. However, to the extent that these individuals view the subsidies embodied within the system as inappropriate bribes paid to property owners for pursuing socially desirable activities which they should have pursued in the absence of any payment, rather than as appropriate compensation paid to these property owners for damages which they absorb when they restrict the activity performed on their properties, the political acceptability of the system of lump-sum payments to these constituents is dubious.

Finally, since any realistic system of lump-sum payments for externalities is unlikely to provide positive net benefits to all of the constituents of the jurisdiction which is considering the adoption of this system of payments, the political acceptability of any system of this type will, in general, be determined to some extent by the relative political influence of those constituents who expect to obtain net benefits from its adoption and those constituents who expect to incur net costs as a result of its adoption.

### 5.3.5 Expected Impacts on Land Use Patterns

To the extent that the adoption of any system of lump-sum payments for externalities increases the total cost of initiating any modification of land use activity above the cost which would have prevailed in the absence of the system, the adoption of the system will discourage the initiation of this modification of land use activity and, hence, will discourage the performance of the land use activity which would have been initiated if this modification of activity had been undertaken. Conversely, to the extent that the adoption of the system decreases the total cost of initiating any modification of land use activity below the cost which would have prevailed in the absence of the system, the adoption of the system will encourage the initiation of this modification of activity and, hence, will encourage the performance of the land use activity which will be initiated when this modification of activity is undertaken. Since any system of lump-sum payments for externalities will provide disincentives for the initiation of any particular land use activity in some situations and incentives for the initiation of this activity in other situations, it is impossible, in general, to determine whether the system provides a net incentive or a net disincentive for the initiation of most land use activities solely on the basis of theoretical considerations. Rather, the net effect of any system of this type in encouraging or discouraging the initiation of any land use activity almost invariably will be an empirical issue. Consequently, the net effect of the adoption of any system of lump-sum payments for externalities upon the overall growth rate of the community is also generally indeterminate.

Nevertheless, the adoption of any system of this type can be expected to exert substantial influence over the pattern of development within any community to which it is applied. Specifically, the adoption of any system of lump-sum payments for externalities can be expected to increase the incidence and stability of those land use activities whose initiation is, on balance, encouraged by the system and to decrease the incidence and stability of those land use activities whose initiation is, on balance, discouraged by the system. Moreover, since the effect of the adoption of a system of this type upon the returns which can be obtained by property owners when they undertake particular modifications of activity may be considerable, it is conceivable that the introduction of a system of this type will produce substantial changes in the pattern of development within the community which adopts the system. However, once again, whether effects of this magnitude actually will be observed constitutes an empirical issue which cannot be resolved purely on the basis of theoretical analysis.

#### 5.4 Publicly Negotiated Settlement Among All Affected Parties

Any externality situation is reciprocal in nature. The economically rational generation of any quantity of an external diseconomy both provides benefits to the emitters of the externality and imposes costs upon the recipients of the externality. Thus, for any positive quantity of an external diseconomy which is rationally generated (i.e., generated for non-malicious reasons) by its emitters, any reduction in the generation of this externality will both provide benefits to the recipients of the externality in the form of reductions in the external costs which are incurred by these individuals and impose costs upon the emitters of the externality in the form of reductions in the profits or satisfaction obtained by these individuals. Conversely, for any quantity of an external diseconomy which is less than the quantity which would rationally be generated in the absence of any voluntary or compulsory internalization, an increase in the generation of the externality will both provide benefits to the emitters of the externality and impose costs upon the recipients of the externality. Moreover, obviously, similar reciprocal characteristics will also exist in any situation involving external economies.

Therefore, in any situation in which an externality is generated, motivations will exist for both the emitters and the recipients of the externality to explore the possibility of negotiating a mutually beneficial modification of the quantity of the externality which is currently being generated. For example, if there are no legal restrictions upon the generation of a particular external diseconomy, the recipients of the external diseconomy will be motivated to offer to the emitters of the externality some portion of any reduction in external costs which the recipients will obtain as a result of a decrease in the generation of the externality to induce the emitters to accept the reduction in their profits or satisfaction which will accompany the decrease in externality generation: while the emitters will be motivated to accept the payments which are offered by the recipients -- and, hence, to perform the requested decrease in externality generation -- if these payments exceed the costs which the emitters will incur if the requested decrease in externality generation is performed. Conversely, if there are binding legal restrictions upon the generation of the external diseconomy, the emitters will be motivated to offer to the recipients of the externality some portion of any gains which the emitters will obtain as a result of an increase in the generation of the externality to induce



the recipients to agree to an appropriate relaxation of these legal restrictions and, hence, to absorb the incremental external costs associated with the increase in externality generation; while the recipients will be motivated to accept the payments which are offered by the emitters -- and, hence, to permit the requested increase in externality generation -- if these payments exceed the incremental external costs which the recipients will incur if the requested increase in externality generation is performed.

Yet, in either of these cases, it will be possible to negotiate a mutually acceptable modification in the generation of the externality only if the gains which will be obtained by the individuals who will benefit from the adoption of the modification exceed the costs which will be incurred by the individuals who will suffer decreases in welfare as a result of the adoption of the modification, since a mutually agreeable set of payments will exist only if this condition is fulfilled. Therefore, any successfully negotiated modification in the generation of an externality will necessarily increase the welfare of at least some members of society without decreasing the welfare of any other members of society and, hence, will unambiguously produce an allocation of resources which is more socially desirable than the resource allocation which would have existed in the absence of the successful negotiation.

Recognizing that a negotiated settlement among all individuals who are affected by an externality will unambiguously promote the attainment of social optimality, it becomes reasonable in any externality situation to consider holding a public hearing involving all of the individuals who are affected by the externality to facilitate the initiation of negotiations among these individuals. Moreover, to establish a basis with respect to which these negotiations can proceed, it will be necessary to specify a rigidly enforced assignment of transferable\* property rights to the generation of the externality (i.e., to delineate the extent to which the emitters of the externality are legally liable for the damages caused by the externality). This assignment of property rights will determine the particular motivations which will exist for both the emitters and the recipients of the externality to engage in

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\*Property rights with respect to liability for damages are transferable if the government enforces liability rules only upon appeal by one of the parties who are involved in the externality situation. This enforcement policy introduces the possibility of exchange between these parties.

negotiations. Then, if there are no costs associated with arranging and enforcing any agreements which are attained in these negotiations, these motivations will induce the individuals who are affected by the externality to engage in transactions concerning the permissible generation of the externality which will proceed until all possible gains from trade have been realized and, hence, a mutually agreeable settlement providing for the economically efficient generation of the externality has been achieved. Thus, potentially, the holding of public hearings involving all individuals who are affected by particular externalities may be capable of unambiguously promoting the attainment of social optimality.

#### 5.4.1 Expected Deviations from Social Optimality

For a negotiated settlement to be capable of attaining the socially optimal generation of an externality, the costs of arranging and enforcing the negotiated settlement must be zero. Otherwise, the individuals who are affected by the externality will rationally choose to conclude their negotiations concerning the control of the externality when they perceive that the costs which they expect to incur in arranging any additional modification in the generation of the externality exceed the gains which they expect to obtain from the performance of the modification in externality generation. Consequently, the allocation of resources which is produced by a negotiated settlement in any realistic externality situation in which the costs of arranging and enforcing a settlement of this type are positive will generally differ from the more socially desirable allocation of resources which would have been produced by a negotiated settlement in this same situation if these costs had been zero.

Moreover, unless the costs of arranging and enforcing negotiated settlements are zero, the income elasticity of demand for each good in the economy (including the externality which is the subject of the negotiations) is zero, and none of the individuals who are affected by the externality are consumers, the equilibrium allocations of resources which are attained through negotiations under alternative assignments of property rights will be different. Since most, if not all, of these conditions will fail to be fulfilled in any realistic externality situation, it will generally be true that different assignments of property rights in the generation of an externality will produce different economically efficient allocations of resources at equilibrium. Although each of these alternative resource allocations will be more socially desirable

than the allocation of resources which would have prevailed if no negotiated settlement had been attained, these alternative resource allocations, in general, will not all provide the same level of social welfare. Therefore, the extent to which social optimality is attained through negotiation in any realistic externality situation will depend critically upon the initial assignment of property rights in the generation of the externality which is established in this situation. Yet, in the absence of detailed knowledge of the nature of the social welfare function, it is impossible to specify the initial assignment of property rights which will be most socially desirable in any particular externality situation. Nevertheless, it is possible to provide some general insights into the considerations which should be addressed in establishing the initial assignment of property rights and in evaluating the social desirability of relying upon publicly negotiated settlements as mechanisms for the control of externalities.

First, since positive costs of arranging negotiated settlements inhibit exchange, the extent to which negotiated settlements will produce modifications in the prevailing generation of any externality will decrease as these costs increase. Moreover, in many externality situations, the costs of arranging negotiated settlements which are associated with alternative assignments of property rights are not identical. For example, in an externality situation in which a single firm is generating smoke which adversely affects a large number of neighboring property owners, the costs of arranging a negotiated settlement are likely to be greater if the smoke-generating firm is not liable for the damages which are attributable to its activities than if the firm is fully liable for these damages. The interests of all of the neighboring property owners must be coalesced to permit the offering of a payment to the smoke-generating firm under the former assignment of property rights. Conversely, the smoke-generating firm may be able to deal with each of the neighboring property owners individually under the latter assignment of property rights. In any externality situation of this type, to the extent that the practically attainable level of social welfare is a monotonically decreasing function of the costs of arranging a negotiated settlement in the situation (i.e., to the extent that a reduction in the costs of arranging a negotiated settlement permits expanded negotiations which, in turn, promote the attainment of an equilibrium allocation of resources which provides increased social welfare), it will be socially desirable to adopt that assignment of property rights in the generation of the externality for which the costs of arranging a negotiated settlement are a minimum.

Yet, to the extent that the negotiated settlements which are attained under different assignments of property rights may incorporate extremely different distributions of welfare among the individuals who are affected by the externality, and to the extent that these differences in the distribution of welfare may significantly affect the aggregate level of social welfare which is attained, the adoption of that assignment of property rights in the generation of this externality for which the costs of arranging a negotiated solution are a minimum may not produce the highest practically attainable level of social welfare. Consequently, in selecting an initial assignment of property rights in the generation of any externality, it will generally be socially desirable to attempt to balance the various costs of arranging a negotiated settlement which are associated with the alternative assignments of property rights which have been delineated against the prospective distributional impacts of these alternative assignments. Nevertheless, obviously, unless this balancing process is performed perfectly, the allocation of resources which actually is achieved will differ from the most socially desirable resource allocation which is practically attainable.

In addition, as the number of individuals who are affected by any externality increases, the probability of attaining any mutually agreeable negotiated settlement declines. Yet, the attainment of any mutually agreeable negotiated settlement will unambiguously provide a net increase in welfare to society in the aggregate. Moreover, for any net increase in aggregate welfare, there exists an infinite number of distributions of this increase for which no member of society will achieve a lower level of personal welfare than he would have attained in the absence of a negotiated settlement. These alternative distributions of welfare are distinguished by the magnitudes of the relative shares of the aggregate increase in welfare which are obtained by the various persons who are affected by the externality. Recognizing opportunities for personal gain in a situation of this type, it becomes individually rational for each of these persons to attempt to obtain a disproportionately large share of the aggregate increase in welfare for himself by refusing to agree to any negotiated settlement which does not contain a bias in the distribution of this aggregate increase which is sufficiently favorable to him. However, if too many of the individuals who are affected by the externality employ this strategy, it is likely that there will exist no distribution of the aggregate increase in welfare which will simultaneously satisfy the various distributional constraints which have been imposed upon an acceptable settlement by all of these individuals. Other things being equal, the probability that this impasse will arise can be expected to increase as the number of individuals who are affected by the externality increases.

Whenever this impasse is confronted, additional negotiations will be required to induce relaxations of the various distributional constraints which are sufficient to permit the attainment of a mutually agreeable settlement. However, when these negotiations involve a large number of people, the attainment of a mutually agreeable settlement assumes many of the properties of a public good. In particular, if any single individual relaxes the distributional constraint which he imposes upon an acceptable settlement, he will generally provide only a marginal increase in the probability of attaining a settlement which is mutually agreeable to all of the individuals who are affected by the externality. However, he will incur the cost of his negotiated decrease in his share of the aggregate increase in welfare with certainty. Therefore, since each person's acquiescence to a relaxation of his distributional constraint will provide for him only a small expected benefit at a relatively high expected cost, it is individually rational for each person to refuse to relax his distributional constraint. Clearly, if a sufficiently large number of the persons who are affected by the externality adopt this strategy, the likely result will be a continued failure to attain a mutually agreeable negotiated settlement. Moreover, if at some point in time after this impasse develops, the individuals who are affected by the externality determine that the expected incremental cost of negotiating a mutually agreeable settlement exceeds the aggregate increase in welfare which will be obtained if a settlement is successfully negotiated, they will rationally choose not to engage in any further attempts to negotiate a settlement. Hence, no modification in the generation of the externality will be achieved.

However, as the number of individuals who are affected by the externality decreases, the extent to which any single individual's relaxation of his distributional constraint will contribute substantially to the probability of attaining a mutually agreeable negotiated settlement will increase. Consequently, it will be more rational for each individual who is affected by the externality to relax his distributional constraint; and, hence, it will be more likely that mutual agreement to a modification in the generation of the externality actually will be attained. Therefore, a mutually agreeable negotiated settlement of an externality problem is more likely to be achieved when only a small number of individuals is involved in the externality situation than when large numbers of persons are affected by the externality.

Finally, it will generally be possible to improve the prospect of attaining a negotiated settlement of any externality problem substantially by requiring less than unanimous approval of any proposal to

modify the generation of the externality (i.e., by eliminating the requirement that the negotiated settlement must be mutually acceptable to all individuals who are affected by the externality). Specifically, requiring less than unanimous consent to any proposal of this type will eliminate the possibility that a small portion of the individuals who are affected by any externality will be able to preclude any modification of the generation of the externality by refusing to accept any proposed settlement which does not incorporate a distribution of the aggregate increase in welfare produced by the modification which is extremely biased in their favor. However, accepting less than the unanimous consent of all individuals who are affected by any externality as authorization for the implementation of a negotiated settlement specifying the permissible generation of the externality introduces the possibility that this implementation will cause at least some of the individuals who have declined to consent to the negotiated settlement to obtain lower levels of personal welfare when the modification in externality generation is performed than they would have obtained if the modification had not been introduced.

Thus, eliminating the requirement of unanimous approval admits the possibility that a negotiated settlement may produce changes in the equilibrium allocation of resources which are not unambiguously socially desirable. Yet, if the level of social welfare associated with the allocation of resources which is attained in any externality situation as a result of a less than unanimous negotiated settlement is greater than the level of social welfare associated with the allocation of resources which actually would have been attained in this same situation if unanimous consent had been required for the adoption of any negotiated settlement, the acceptance of less than unanimous approval of a negotiated settlement will be socially desirable in this situation. Nevertheless, in general, the allocation of resources which will be attained as a result of a less than unanimous negotiated settlement can be expected to deviate to some extent from the socially optimal resource allocation.

#### 5.4.2 Information Requirements and Information Retrieval Considerations

In comparison with other mechanisms for the control of externalities between private land uses, the information required for the administration of publicly negotiated settlements among all individuals who are affected by an externality is extremely limited. In particular, there is no need for any agency which is responsible for the administration of settlements of this type to gather information concerning the

external costs which are attributable to the generation of any externality. However, it is necessary that each individual who is affected by an externality must be aware of the costs which he will absorb himself as a result of any modification in the generation of the externality, so that he can either make appropriate offers to or appropriately accept or reject offers from the other individuals who are affected by the externality.

However, the administrative agency must collect sufficient information to identify those externality situations for which it is socially desirable to hold public hearings. Although conceivably a public hearing could be convened for every externality situation, society must incur some costs in conducting any hearing. Therefore, in general, it will be socially undesirable to insist upon conducting a public hearing in every externality situation. In particular, it is unnecessary to conduct public hearings in those situations in which the externality is voluntarily controlled without public intervention by mutually agreeable settlements among all individuals who are affected by the externalities. Similarly, the conducting of public hearings will be socially undesirable in those externality situations in which the net increases in welfare to be obtained by all members of society from the control of the externalities are less than the costs of conducting these hearings. Finally, public hearings may be socially undesirable in many externality situations which involve large numbers of emitters and recipients of the externality, where negotiations are unlikely to produce any settlements providing for modifications in the generation of the externalities.

Consequently, to identify those externality situations in which the conducting of public hearings may be socially desirable, it will be necessary, in each externality situation, for the agency which is responsible for the administration of the hearings to determine whether private negotiations already have produced mutually agreeable settlements concerning the control of the externality, to estimate the net increase in welfare which society can expect to obtain as a result of any negotiated settlement of the externality situation, to assess the costs which the agency and all of the individuals who are affected by the externality can expect to incur as a result of their participation in a public hearing concerning the situation, and to evaluate the possibility that any acceptable settlement can be negotiated among the number of individuals who are involved in the situation. Moreover, for each externality situation in which the conducting of a public hearing is determined to be socially desirable, it will be necessary for the

administrative agency either to identify the property rights in the generation of the externality which have been assigned to each of the individuals who are affected by the externality or, if no assignment of property rights has been established, to assign property rights to these individuals in the manner described in Section 5.4.1.

#### 5.4.3 Potential Inequities, Abuses, and Enforcement Problems

Especially, although not exclusively, when unanimous approval is required for the adoption of a negotiated settlement, inequities can arise whenever some of the individuals who are affected by an externality refuse to ratify any proposed settlement which does not incorporate a distribution of the net increase in aggregate welfare produced by the settlement which is not sufficiently biased in their favor. At the extreme, the adoption of this strategy by a large enough number of the individuals affected by the externality can preclude the attainment of any negotiated settlement and, hence, can deny to all of the individuals who are involved in the externality situation the increase in social welfare which could have been provided to them by a negotiated settlement. Moreover, even when a negotiated settlement is successfully attained, it is likely that the net increase in aggregate welfare produced by this settlement will be inequitably distributed in a manner which is biased in favor of those individuals who have been most intractable in the negotiation of the settlement.

Although the prospects of these inequities can be reduced by eliminating the requirement of unanimous consent as authorization for the implementation of a negotiated settlement, the relaxation of this requirement introduces the possibility that some of the individuals who are affected by the externality will attain lower levels of personal welfare with a negotiated settlement than they would have attained in the absence of a settlement. Moreover, these inequities will be most severe to the extent that the less than unanimous negotiated settlements which are attained in different externality situations systematically cause the same individuals to suffer decreases in their personal welfare.

In addition, if any of the individuals who are affected by any particular externality fail to comply with the terms of the negotiated settlement which has been attained in this externality situation (or, in the absence of any negotiated settlement, with the stipulations of the prevailing assignment of property rights), those individuals who are



damaged by this lack of compliance will have to rely upon the judicial system to compel adherence to the established degree of control of the externality. However, litigation is costly in terms of both time and resources; and the outcome of virtually any judicial proceeding is uncertain. Consequently, inequities will arise if the adversely affected individuals decline to pursue litigation because of this cost and uncertainty; while abuses will occur if some individuals intentionally decline to adhere to the established degree of control of the externality in the belief that this behavior will not be challenged in court by the adversely affected individuals because of this cost and uncertainty.

Moreover, even if litigation is initiated, it is unlikely that the judicial system will produce an adjudicated settlement which unambiguously promotes the attainment of social optimality. To guarantee the provision of an adjudicated settlement of this type, the court must have access to accurate information specifying the incremental costs which will be incurred by each of the individuals who are affected by the externality as a result of any modification in the generation of the externality. However, the provision of reasonably accurate estimates of these costs will, in general, confront the same technical and motivational problems which arise in the provision of reasonably accurate estimates of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2. Consequently, the estimates of these costs which will be obtainable by the courts for any externality situation will necessarily be relatively crude; and, as a result, the settlement which is established by the courts in this situation is likely to cause some individuals to suffer decreases in personal welfare.

Indeed, the prospect that this result will prevail is intensified when relatively large numbers of individuals are involved in the externality situation because of the procedural rules which have been developed to determine any particular individual's eligibility to participate in legal proceedings concerning a particular externality situation. Although, conceivably, each adversely affected individual could bring suit against each individual who has failed to adhere to the established degree of control of the externality, a reduction in the cost of pursuing litigation can be obtained by allowing all adversely affected individuals to join together in initiating and maintaining this litigation. However, the prevailing rules of joinder may affect the ability of these individuals to adopt this strategy. Although the rules of joinder vary among states, the potential impact of these rules can be assessed to a reasonable extent by considering the Federal rule for joinder. This rule requires

that the court must determine both that a common question of law or fact is involved for each individual who wishes to join in the litigation and that each of these prospective plaintiffs has a claim against each defendant, before these prospective plaintiffs can be permitted to join together in bringing suit.\* Obviously, if the application of this rule excludes any adversely affected individuals from participation in the litigation, it is likely that the settlement attained in this litigation may be inequitable at least with respect to these excluded individuals.

Moreover, additional prospects for the attainment of inequitable adjudicated settlements arise when the number of individuals who are affected by an externality becomes so large that joinder becomes impractical. Under these circumstances, the legal mechanism for the attainment of an adjudicated settlement of an externality situation becomes the class action suit. A class action suit has been described as providing:

"a means by which, where a large group of persons are interested in a matter, one or more may sue... as representatives of the class without needing to join every member of the class."\*\*

However, as a practical matter, the procedural rules which have been established to control the initiation and maintenance of a class action suit may severely limit the ability of this legal mechanism to promote the attainment of social optimality. In particular, two recent decisions have severely restricted the ability of class action suits brought before Federal courts to establish unambiguously socially desirable controls over externalities. First, in Zahn v. International Paper Company,\*\*\* the court has ruled that, for an individual to be included within a class in a Federal class action suit, this individual must satisfy the Federal jurisdictional amount requirement.\*\*\*\* This requirement states that any entity which does not incur damages of more than \$10,000 as a result of the generation of an externality cannot be included as a member of the class in a Federal class action suit concerning the control of the externality and, hence, must rely upon the state courts to adjudicate its grievances. Obviously, this interpretation of the Federal

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\*Federal Rule of Civil Procedure §20.

\*\*Wright (118), p. 306.

\*\*\*414 U.S. 291 ( 1973).

\*\*\*\* 28 U.S.C. §1332 (a).

jurisdictional amount requirement introduces the possibility that the adjudicated settlements which are attained in Federal class action suits may be inequitable at least with respect to those individuals who are excluded from participation in these suits by the jurisdictional amount requirement. Second, in Eisen v. Carlisle and Jacquelin,\* the Supreme Court has ruled that the plaintiffs representing a class in a Federal class action suit must, at their own expense, individually notify each and every member of the class whose name and address is known or can be ascertained. Clearly, this requirement will increase the cost of initiating any class action suit in the Federal courts and, hence, may discourage the initiation of suits whose adjudicated settlement would be socially desirable.

Similar problems arise in the adjudication of class action suits in the state courts. Presently, there are three types of class action statutes which have been enacted by the states. One type is modeled after the current Federal class action rules,\*\* which admits the possibility that state courts could also rule that individual notification of all class members is required. If this ruling is adopted by any state court, it is likely to preclude the initiation of some class action suits whose adjudicated settlement would be socially desirable. In addition, this type of class action statute provides that, in any class action suit, all potential members of a class will be bound by the court decision with respect to this suit unless they have “opted-out” of the litigation by notifying the court of their intention not to be a member of the class. This provision introduces the possibility that some individuals will be involuntarily constrained by court decisions resulting from litigation of which they have been unaware and in which they would have had no desire to participate.

The second type of class action statute which has been enacted by some states is modeled after the old Federal class action rule, which differs dramatically from the present Federal class action rule to the extent that the old rule provides that, in any class action suit, no potential members of a class will be bound by the court decision with respect to the suit unless they have “opted-in” to the litigation. This provision admits the possibility that some individuals will be denied the benefits of an adjudicated settlement of an externality situation because they have been unaware of the proceedings which have produced this settlement.

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\*94 S. Ct. 2140 (1974).

\*\*Federal Rule of Civil Procedure §23.

Finally, the third type of class action statute which has been adopted by some states is modeled after the New York Field Code,\* which provides that, in any class action suit, all potential members of a class will be bound by the court decision with respect to the suit if the plaintiff represents the common interests of the class. This procedural rule permits the court to exercise substantial discretion about the extent of applicability of its decision with respect to a class action suit. However, in the absence of perfect knowledge on the part of the court, it is unlikely that the adjudicated settlements attained under this procedural rule will unambiguously promote the attainment of social welfare in all cases.

Nevertheless, all three types of class action statutes which have been enacted by the states do contain one common safeguard against inequities and abuses. In no case can a class action suit be concluded prior to the establishment of a court decision without the approval of the court. This restriction provides some protection against the possibility that the representatives of the class will make a deal with the defendants in the litigation which is detrimental to the interests of the remainder of the class.

#### 5.4.4 Political Acceptability

The political acceptability of adopting publicly negotiated settlements among all individuals who are affected by any externality as a mechanism for the control of the externality is likely to be strongly influenced by the particular assignment of property rights in the generation of the externality which is established as a basis for these negotiations. An assignment of property rights which declares the emitters of the externality to be fully liable for the damages attributable to the externality will be supported by the recipients of the externality and opposed by the emitters of the externality; while an assignment of property rights which absolves the emitters of any liability for the damages attributable to the externality will be supported by the emitters of the externality and opposed by the recipients of the externality. Whether either of these extreme assignments of property rights, or any more moderate assignment of property rights, would actually be politically acceptable within any particular jurisdiction would necessarily depend upon the balance of political influence between these two groups in the jurisdiction.

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\*See Ch. 438, §119 (1849), N. Y. Laws 72nd Sess. 639.

Moreover, to the extent that the attainment of a negotiated settlement in any externality situation will require the transfer of direct cash payments among different individuals who are affected by the externality and to the extent that the constituents of a political jurisdiction consider these direct cash payments to be socially undesirable bribes to induce modifications in the generation of the externality (i.e., either payments to pollute or extortions extracted under threat of pollution), publicly negotiated settlements among all individuals who are affected by externalities is likely to be politically unacceptable within the jurisdiction in the absence of the exertion of considerable public relations efforts by its proponents.

#### 5.4.5 Expected Impacts on Land Use Patterns

The expected impact of publicly negotiated settlements among all individuals who are affected by externalities upon the pattern of development in an area will be strongly influenced by the particular assignment of property rights in the generation of externalities which is established in the area. If the assignment of property rights which is adopted in a region declares emitters of externalities to be completely free of any liability for the damages attributable to these externalities, the attainment of a negotiated settlement will require the recipients of these externalities to offer inducements to the emitters to restrict their generation of the externalities. Thus, under this assignment of property rights, to preclude a modification in the pattern of development in the region, it will be necessary for the existing residents of the region to negotiate settlements with potential developers of the region in which the existing residents induce the potential developers to refrain from initiating their proposed projects. However, given the large number of existing residents in any region who are likely to be affected by the externalities which will be generated by any large-scale project which is proposed, the negotiation of a settlement with the proposed developers of a large-scale project to forestall the initiation of the project will assume the properties of a public good for these existing residents. Therefore, under this assignment of property rights, negotiated settlements to forestall the development of large-scale projects will be achieved very infrequently; although negotiated settlements might be successful in precluding the development of some small-scale projects which generate externalities which adversely affect only a limited number of the existing residents of the region.

Conversely, if the assignment of property rights which is adopted in a region declares emitters of externalities to be fully liable for the damages attributable to these externalities, the attainment of a negotiated settlement will require the emitters to offer inducements to the recipients of the externalities to increase their absorption of the externalities. Thus, under this assignment of property rights, to produce a modification of the pattern of development in the region, it will be necessary for potential developers of the region to negotiate settlements with the existing residents of the region in which the potential developers induce the existing residents to accept the introduction of their proposed projects. However, given the large numbers of existing residents in any region who are likely to be affected by the externalities which will be generated by any large-scale project which is proposed, it is reasonably probable that a sufficiently large number of these existing residents will refuse to ratify any proposed settlement which is not sufficiently biased in their favor to preclude the negotiation of any settlement which permits the introduction of the proposed project. Therefore, under this assignment of property rights, negotiated settlements to permit the development of large-scale projects will be achieved very infrequently; although negotiated settlements might be successful in obtaining approval of the development of some small-scale projects which generate externalities which adversely affect only a limited number of the existing residents of the region.

Clearly, relative to the pattern of development which would have existed in the absence of any control of externalities, the assignment of full liability for the damages attributable to these externalities to the emitters of these externalities will have a much more limiting effect upon the pattern of development than will the assignment of no liability for these damages to these individuals. Nevertheless, to the extent that the negotiated settlements which are attained under any assignment of property rights cause potential developers to recognize external costs attributable to their proposed projects which they otherwise would have ignored, these settlements will inhibit the introduction of some projects which otherwise would have been undertaken. Yet, conversely, to the extent that these negotiated settlements also reduce the external costs which are incurred by those land uses which would have been adversely affected by the projects whose introduction has been inhibited, these negotiated settlements will encourage the expansion of these land uses. Consequently, the net impact of publicly negotiated settlements among all individuals who are affected by externalities upon the pattern of development and the aggregate rate of growth of any region is essentially an empirical issue which cannot be resolved purely on the basis of theoretical considerations.

## 5.5 Public Purchase of Scenic or Environmental Easements

Under a system of property rights which assigns to the owner of any parcel of land the right to use the parcel of land in any manner which he determines to be desirable, the unambiguous promotion of the attainment of social optimality through the control of any external effects which are attributable to an individual's use of his property requires that the property owner must be adequately compensated for any modifications of the permissible use of his property which are required for the implementation of this control. That is, the property owner must be paid compensation which is sufficient to guarantee that he attains a level of personal welfare when these external effects are controlled which is at least as great as the level of welfare which he would have achieved if control had not been exercised. In addition, to assure that no other member of society suffers a decrease in his personal welfare as a result of the control of these external effects, it also must be true that both the total benefits which are obtained by all of these other members of society as a result of this control equals or exceeds the total costs which are incurred by these individuals (including the compensation which they pay to the owner of the property whose use has been restricted) in implementing the control and the total benefit which is obtained by each of these other members of society as a result of this control is not less than the total cost which this individual incurs as a result of the implementation of the control.

Theoretically, all of these conditions can be fulfilled through the public purchase of scenic or environmental easements, under which the property owner surrenders the right to use his property in certain specified ways in exchange for a monetary payment from the government. However, numerous practical problems arise in attempting to implement a public policy of purchasing scenic and environmental easements which are likely to cause any actual purchase of a scenic or environmental easement to produce an allocation of resources which deviates from the socially optimal resource allocation.

### 5.5.1 Information Requirements and Information Retrieval Considerations

For the public purchase of any particular scenic or environmental easement to promote unambiguously the attainment of social optimality, it must be true that the cost which is incurred by the property owner

from whom the easement is purchased, as a result of the establishment of the easement, does not exceed the net benefits which are obtained by all other members of society as a result of the establishment of the easement. Thus, conceptually, the cost incurred by this property owner and the net benefits obtained by all other members of society as a result of the establishment of the easement constitute the lower and upper bounds, respectively, of the range of compensation which could be paid for the easement while promoting the attainment of social optimality.

Unfortunately, the estimation of the value of either of these bounds is not easily performed. The net benefits obtained by all other members of society as a result of the establishment of the easement are equal to the discounted present value of the difference between the external costs which will be incurred by all of these individuals during each year in the future if the easement is not established and the external costs which they will incur during each of these years if the easement is purchased less the costs of negotiating the purchase of and enforcing the property owner's compliance with the easement. Although the negotiation and enforcement costs probably can be estimated reasonably accurately, the estimation of the discounted present value of the external costs which will be incurred with or without the easement constitutes an extremely difficult task. In particular, the technical and motivational problems in the estimation of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2 will arise once again in the determination of the appropriate compensation to pay for a scenic or environmental easement. Consequently, the estimates of external costs which are obtainable for even the current year will necessarily be relatively crude. Moreover, because any individual's estimate of his willingness to pay for the control of externalities becomes more speculative as the time period for which this estimate is provided lies further in the future, the estimates of external costs which will be obtainable for years in the increasingly distant future will undoubtedly be even less reliable than the estimates which are obtainable for the current year.

In addition, the discounting of these estimated future external costs requires the determination of the appropriate interest rate at which to perform this discounting. As explained in Section 5.3.2, this determination will require the forecasting of the average interest rate which will prevail in the market during each year in the future. The inevitable imperfection of these forecasts will introduce additional



inaccuracies into the estimation of the net benefits which will be obtained by all members of Society, except the property owner from whom this easement is purchased, as a result of the establishment of a scenic or environmental easement.

The estimation of the cost which is incurred by the property owner from whom the easement is purchased as a result of the establishment of the easement poses equally difficult problems. Theoretically, this cost is equal to the amount of wealth which must be given to this property owner to guarantee him the attainment of the same level of personal welfare when the easement is established that he would have obtained if the easement had not been established. Unfortunately, there exists no general method of objectively measuring this amount of wealth. If the property owner obtains the same satisfaction from his utilization of his property with the easement that he would have obtained without the easement, the amount of wealth which he must be paid to maintain his level of personal welfare at the level which he would have attained in the absence of the easement is equal to the difference between the market value of his property without the easement and the market value of his property with the easement. However, if the property owner suffers a decrease in the satisfaction which he obtains from using his property as a result of the establishment of the easement (i.e., if he is restricted from performing activities which he personally enjoys and, hence, suffers a decrease in the value which he personally attaches to the property) and if there exists absolutely no substitutes for this property, the amount of wealth which must be paid to this property owner is equal to the difference between the market value of his property without the easement and the market value of this property with the easement plus the difference between the value which he personally attaches to the property without the easement and his personal valuation of the property with the easement.

Finally, if the property owner suffers a decrease in his personal valuation of his property as a result of the establishment of the easement and if there exist reasonable substitutes for this property, the amount of wealth which must be paid to this property owner is equal to the difference between the market value of his property without the easement and the market value of this property with the easement plus the lesser of either the decrease in the property owner's personal valuation of his property or the minimum for all reasonable substitute properties of the sum of, first, the total costs which the property owner must incur in moving from his present property to each substitute property and, second, the difference between the market value of this substitute property and the market value of his present property without

the easement and, third, the difference between his personal valuation of his present property without the easement and his personal valuation of the substitute property.

Since the imposition of a formal constraint upon a property owner's use of his own property cannot increase his personal valuation of this property (because he could have imposed this constraint upon himself informally if it would have increased the value which he personally attaches to the property) and since the property owner has freely chosen to own his present property, it is clear that the differences between the market value of the property without the easement and the market value of the property with the easement constitutes a lower bound on the cost incurred by the property owner as a result of the establishment of the easement. Consequently, in general, the estimation of the actual value of this cost will require knowledge of the property owner's personal valuation of his present property both with and without the easement, the market value of this property both with and without the easement, the property owner's personal valuations of all reasonable substitute properties, the market values of these substitute properties, and the costs of moving from the owner's present property to each of these substitute properties.

Reasonably accurate estimates of both the prevailing market values of properties and the costs of moving can usually be obtained from readily available data sources. However, the direct estimation of the market value which will prevail for a property to which an easement will be applied after this easement has been established may be severely constrained by society's lack of experience with the purchase of less than fee simple interests in land. Yet, to the extent that the constraints stipulated in easements are similar to the restrictions contained in municipal zoning ordinances, reasonable estimates of the effect of the establishment of an easement on the market value of property should be inferable from evidence of the effect of similar zoning restrictions upon the market values of similar properties. Therefore, initially, it will generally be desirable to conduct statistical studies of the relationship between zoning restrictions and the market values of the properties to which these restrictions are applied and, then, to utilize the results of these studies to estimate the expected effect of the establishment of easements on the market values of the properties to which these easements are applied.

Moreover, subsequently, as a community's experience with the establishment of easements expands, it will be desirable to develop data files which specify, for each property which is exchanged in the

community, the market value which is established for the property in that exchange, the restrictions upon the use of the property which are stipulated in easements or other government regulations, the characteristics of the property and its neighborhood which can be expected to affect the property's market value, and the date on which the property has been exchanged. After a sufficiently large number of exchanges of property have been described in this manner in these data files, it should be possible to conduct statistical studies of the relationships among all of these variables which ultimately will permit the direct estimation of the value which any property can be expected to command in the market when any particular restrictive easement is applied to the property.

Finally, it is necessary to obtain acceptable estimates of the personal valuations which the owner of the property to which the easement will be applied attaches to various properties. Unfortunately, the provision of adequate estimates of these personal valuations generally requires detailed knowledge of the property owner's tastes and preferences -- knowledge which he normally will have no motivation to divulge accurately to the administrative agency responsible for purchasing scenic or environmental easements. Specifically, to the extent that his revelations of his personal valuations of various properties might influence the payment which he receives for an easement, it will be rational for him to overstate his personal valuation of his property without the easement and to understate both his personal valuation of the property with the easement and his personal valuations of all alternative properties. Consequently, the obtaining of reasonably accurate estimates of the property owner's personal valuations of properties may be impossible and, hence, the best obtainable estimate of the cost incurred as the result of the establishment of an easement by the owner of the property to which the easement is applied usually will be relatively crude.

#### 5.5.2 Expected Deviations from Social Optimality

The analysis developed in Section 5.5.1 clearly demonstrates that, in general, it will be impossible to produce accurate estimates of either the upper bound or the lower bound of the range of compensation payments which could be made for an easement while unambiguously promoting the attainment of social optimality. Therefore, the possibility generally exists that the payment which actually is made for a scenic or environmental easement may fail to promote the

attainment of social optimality. In particular, if the purchase of an easement results from completely voluntary negotiations, the compensation payment which actually is made may exceed the maximum payment which might conceivably promote the attainment of social optimality; while if the purchase of an easement is effected through an actual or threatened exercising of the power of eminent domain, the compensation payment which actually is made may either exceed this maximum payment or fall short of the minimum payment which might conceivably produce this result.\*

Consequently, it is likely that, in some instances, the inaccurate measurement of the costs and benefits which are attributable to the establishment of scenic or environmental easements may precipitate either the purchasing of unambiguously socially undesirable easements or the failure to purchase potentially socially desirable easements. In particular, inaccuracies in the estimation of the values of the costs incurred by the owner of the property to which an easement is applied and the net benefits obtained by all other members of society as a result of the establishment of this easement may produce a determination that the net benefits attributable to the establishment of the easement exceed the costs attributable to its creation when, in fact, the costs exceed the net benefits. Errors in measurement of this type will precipitate the purchasing of scenic or environmental easements whose establishment necessarily is socially undesirable because, regardless of the amount of compensation paid to the owners of the properties to which the easements are applied, some member or members of society inevitably will suffer decreases in personal welfare as a result of the establishment of the easement. Similarly, inaccuracies in the estimation of costs and benefits may, in some instances, produce a conclusion that the costs attributable to the establishment of an easement exceed the net benefits attributable to its creation when, in fact, the opposite is true. Errors of measurement of this type will cause a failure to

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\*The compensation payment which actually is made when the purchase of an easement is freely negotiated will never be less than the minimum payment which might conceivably promote the attainment of social optimality because a payment which is less than this minimum will cause the owner of the property to which the easement will be applied to suffer a decrease in his personal welfare and, hence, will be rejected by this property owner.

purchase easements, whose establishment is potentially socially desirable and, hence, will cause all members of society to experience lower levels of personal welfare than they simultaneously could have experienced if the easements had been established appropriately.

Admittedly, socially undesirable consequences of both of these types are reversible to the extent that any undesirable easements which have been established can be sold back to the owners of the properties to which they have been applied and any desirable easements which have not been established can be purchased belatedly by the government. However, society will suffer irrecoverable losses of aggregate welfare throughout the time period during which these errors are not recognized and corrected. Moreover, the possibility also exists that any delay in the purchase of a potentially socially desirable easement will permit the development of a use on the property to which the easement will apply whose initiation and discontinuation will require the incurring of costs which could have been avoided completely if the delay had not occurred.

In addition, in those situations in which the establishment of a scenic or environmental easement is potentially socially desirable, inaccuracies in the estimation of the costs and benefits attributable to the establishment of these easements may cause the compensation payments which are made to the owners of the properties to which the easements are applied to be either inappropriately large or inappropriately small and, hence, may cause the establishment of these potentially socially desirable easements to incorporate socially undesirable distributional effects. Specifically, if the compensation which actually is paid for the establishment of a potentially socially desirable easement exceeds the maximum payment which might conceivably promote the attainment of social optimality, some member or members of society other than the owner of the property to which the easement is applied will suffer decreases in personal welfare as a result of the purchase of the easement. Conversely, if the actual compensation payment for a potentially socially desirable easement is less than the minimum payment which might promote the attainment of social optimality, the owner of the property to which the easement is applied will suffer a decrease in his personal welfare as a result of the establishment of the easement. Neither of these effects is socially desirable so long as individual preferences are weighted positively in the social welfare function.

Finally, even if the easement which is established in a particular externality situation is potentially socially desirable and the compensation payment which is made for the easement is appropriate in the aggregate, socially undesirable distributional effects might be produced by the mechanism which is employed to finance the compensation payment. For the purchase of an easement to promote unambiguously the attainment of social optimality, the funds which are employed to finance its purchase must be obtained from a revenue source which imposes upon each member of society other than the owner of the property to which the easement is applied a tax whose total value does not exceed the net benefit which this member of society will obtain as a result of the establishment of the easement. However, the difficulty of obtaining any reasonably accurate estimates of this net benefit has been described in detail previously in this section and has led directly to the conclusion that any estimate of this net benefit which, in practice, can be produced will necessarily be relatively crude. Consequently, it will virtually inevitably be impossible to guarantee that the tax mechanism which is employed to finance the purchase of any scenic or environmental easement will unambiguously promote the attainment of social optimality. Rather, in general, it is likely that this tax mechanism will cause some members of society to suffer decreases in personal welfare as a result of the purchase of the easement.

The analysis of scenic or environmental easements which has been developed up to this point has implicitly assumed that the restrictions which are specified in these easements have already been determined. However, obviously, the extent to which any particular scenic or environmental easement promotes the attainment of social optimality will be strongly influenced by the nature of the restrictions upon development which are specified in the easement. To promote unambiguously the attainment of the socially optimal allocation of resources, an easement must restrict the generation of any particular adverse external effect to that level at which, first, the incremental cost which is imposed upon society by the last unit of the externality which is actually generated is equal to the incremental benefit which is obtained by society as a result of the generation of this unit of the externality and, second, for any increase in the generation of the external effect, the incremental cost incurred by society exceeds the incremental benefit obtained by society. To determine the level of generation of the externality which will fulfill these conditions, it is necessary to estimate both the cost which the establishment of the easement will impose upon the owner of the property to which the easement will be applied for each level of restriction of the generation of the externality which might be

specified in the easement and the net benefits which the establishment of the easement will provide to all other members of society for each of these levels of restriction. However, any attempt to obtain reasonably accurate estimates of these costs and benefits for any particular level of restriction of the generation of the externality will confront all of the theoretical and empirical problems which have been described in detail in Sections 5.1.2 and 5.5.1. Consequently, the estimates of the incremental costs and incremental benefits of restricting the generation of the externality which, in practice, are obtainable will necessarily be somewhat inaccurate. Therefore, it will almost inevitably be true that the restrictions specified in any scenic or environmental easement which actually is established will deviate to some extent from those restrictions whose inclusion in the easement would unambiguously promote the attainment of social optimality. Thus, the easements which actually are established will almost invariably provide a level and pattern of externality generation which is socially suboptimal.

Moreover, even if the socially optimal level of externality generation can be unambiguously identified, the establishment of an easement will not be capable of guaranteeing the attainment of this level of externality generation unless the conditions which must be fulfilled to assure its attainment can be stipulated in a manner such that compliance with these stipulated conditions by the activity performed on the property to which the easement is applied can be monitored in a technically reliable and economically feasible manner. Thus, if it is impossible to monitor the generation of the externality directly and if the activities performed on the property which can be monitored effectively are not appropriately functionally related to the generation of the externality, it will be impossible to guarantee the attainment of the socially optimal level of externality generation through the establishment of a scenic or environmental easement.

Finally, the establishment of a scenic or environmental easement will, in many instances, be incapable of promoting the attainment of social optimality because easements are essentially negative control mechanisms. A scenic or environmental easement, at best, delineates the maximum permissible level of externality generation which can be performed on a parcel of land. However, it provides no direct incentive to the owner of the property to generate a smaller quantity of the externality if this change in externality generation is or becomes socially desirable. Thus, for example, although a change in technology which reduces the cost of controlling the generation of an externality may cause a decrease in the generation of the externality to become

socially desirable, scenic or environmental easements contain no mechanisms which will automatically permit the owners of the properties to which the easements are applied to acquire some portion of the decrease in external costs which will be obtained by the remainder of society if the technological change is introduced. Therefore, these easements provide no motivation to these property owners to adopt this socially desirable technology. Rather, if the technology is to be introduced, the government must, first, become aware of its availability and potential social desirability and, then, must negotiate restrictive modifications of the existing easements to provide for the introduction of the technology.

#### 5.5.3 Potential Inequities, Abuses, and Enforcement Problems

Since both the decision to establish a scenic or environmental easement on any property and the magnitude of the payment which is made to the owner of the property to compensate him for the establishment of the easement are directly related to the magnitude of the external costs which will be imposed upon society by the activity which will be performed on the property in the absence of the easement, a property owner can increase the return which he obtains from his property by displaying a convincing interest in initiating activities upon the property which will impose substantial external costs upon other members of society when he has no actual interest in initiating these activities. If, in this manner, a property owner successfully induces the government to purchase an easement on his property which prohibits the pursuit of an activity which the property owner would not have chosen to initiate under the prevailing and foreseeable economic conditions in the absence of the easement, an unnecessary expenditure of public funds and, hence, a socially undesirable transfer of income from the remainder of society to the property owner will have been performed. Yet, the motivation clearly exists for property owners to adopt strategies which might product these results. Therefore, to protect society from this form of bribery, any agency responsible for the purchase of scenic or environmental easements should attempt to forecast throughout the foreseeable future the expected use of each property to which the application of an easement is being considered. Nevertheless, unless this forecasting process is perfect, the, possibility will exist that the agency both might be induced to purchase some socially undesirable easements and might mistakenly choose not to purchase some socially desirable easements.



In addition, since, in many instances, the purchase of a socially undesirable easement will provide an increase in wealth to the property owner from whom the easement is purchased, motivations will exist for this property owner to offer some portion of this increase in wealth to the public official who is responsible for deciding whether to purchase an easement on his property to induce this official to purchase the easement. To the extent that this bribery is successful, the public purchase of scenic or environmental easements will cause some member of members of society, other than the property owners from whom socially undesirable easements are purchased and the public officials who have accepted bribes, to suffer decreases in personal welfare as a result of the establishment of these socially undesirable easements.

Moreover, additional inequities are likely to result from the public purchase of scenic or environmental easements if an exercising of the power of eminent domain is either performed or threatened to compel or induce the sale of an easement by any property owner. The legal concept of "just compensation," which determines the payment which will be made to the property owner from whom an easement is purchased in any eminent domain proceeding, employs as its basic appraisal standard the value for which a property might be expected to be exchanged in the market. Therefore, if accurate estimates can be obtained of the market value of the property to which the easement will be applied both with and without the easement, the "just compensation" which will be paid to the owner of this property for the establishment of the easement will be equal to the difference between the market value of the property without the easement and the market value of the property with the easement. However, as has been demonstrated in Section 5.5.1, this difference represents merely the lower bound on the amount of compensation which must be paid to the property owner to guarantee that he will not suffer a decrease in his personal welfare as a result of the establishment of the easement.

Consequently, in general, the payment of legal "just compensation" to the owner of any property to which an easement is applied will cause the property owner to suffer a decrease in his personal welfare as a result of the establishment of the easement. In fact, even if a property owner accepts a payment in excess of the legal "just compensation" in exchange for the establishment of an easement on his property, this property owner may suffer a decrease in his personal welfare as a result of the establishment of the easement if the administrative agency which is responsible for purchasing scenic or environment easements has warned him that the power of eminent domain will be

exercised to compel the establishment of an easement on his property if he refuses to accept a negotiated settlement. In this situation, it will be rational for the property owner to accept any compensation which is offered which exceeds the difference between the legal "just compensation" which he expects to receive if the easement is established as a result of formal eminent domain proceedings and the costs which he will incur if he participates in these formal proceedings -- even if the compensation which is offered by the administrative agency is inadequate to protect him against a decrease in his personal welfare.

Finally, inequities in the treatment of different property owners can be produced by the inconsistent monitoring of the activities which are performed upon the various properties to which easements are applied. If these easements impose binding constraints upon the use of the properties in the sense that they prohibit the owners of the properties from pursuing activities on their properties which they would have performed in the absence of the easements, motivations will exist for these property owners to increase the return which they obtain from their property by violating the conditions specified in the easements. Consequently, it will be necessary for the agency which is responsible for the administration of the easements to monitor the compliance of the activities performed on the properties to which the easements are applied with the conditions specified in the easements. However, unless this agency monitors the activities which are performed on each of these properties on a continuous basis, it is likely that inequities will arise between property owners whose violations of the conditions of their easements are not detected until a substantial period of time has elapsed after the initiation of these violations, and property owners who conscientiously adhere to the conditions specified in their easements. Moreover, since the violation of the conditions specified in any easement will provide an increase in wealth to the owner of the property to which the easement is applied, motivations will exist for the property owner to offer some portion of this increase in wealth to the public official who is responsible for monitoring the compliance of the activities performed on his property with the conditions specified in the easement. Therefore, it is conceivable that, in some situations, the inequities associated with inconsistent monitoring will constitute intentional abuses of the public policy of establishing scenic and environmental easements rather than merely random aberrations of this policy.

#### 5.5.4 Legal Constraints and Political Acceptability

If the establishment of a scenic or environmental easement involves an exercising of the power of eminent domain, two legal conditions must be fulfilled. First, the owner of the property to which the easement is applied must be paid "just compensation" for the damage which he suffers as a result of the establishment of the easement. Thus, it is unconstitutional for any public agency to establish an easement on any property without paying the owner of the property compensation which is at least equal to the difference between the market value of the property without the easement and the market value of the property with the easement. Second, the constraints which are imposed upon the use of the property to which the easement is applied must serve a public purpose. Therefore, any administrative agency which attempts to establish a scenic or environmental easement through an exercise of the power of eminent domain must be prepared to demonstrate to the satisfaction of the court the benefits which will accrue to society as a result of the establishment of the easement.

Yet, those political jurisdictions which have already experimented with the public purchase of scenic and environmental easements have not encountered any substantial difficulties in the establishment of easements as a result of these legal requirements.\* To the extent that these favorable experiences are generally known, they should enhance the political acceptability of the public purchase of scenic or environmental easements in other political jurisdictions. Moreover, to the extent that the purchase of scenic or environmental easements is considered to be similar to other public purchases of real property (e.g., the condemnation of fee simple interest in land under the power of eminent domain) by the constituents of a political jurisdiction, the political acceptability of the public purchase of these easements should be further improved. However, to the extent that these constituents consider the use of public funds to purchase scenic or environmental easements to be a lower priority use of these funds than the financing of the provision of other public services, the public purchase of easements may be less acceptable politically than externality control policies which do not require the payment of public funds to private individuals.

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\*See, for example, Penn (83).

#### 5.5.5 Expected Impact on Land Use Patterns

To the extent that the establishment of scenic or environmental easements will preclude the development of activities which otherwise would have been introduced on the properties to which the easements are applied, growth will be restricted by the establishment of the easements. Conversely, to the extent that the decreases in external costs which are attributable to modifications in the activities which are performed upon the properties to which scenic or environmental easements are applied induce an expansion of the development of other properties in the region in which the easements have been established, growth will be encouraged by the establishment of easements. Thus, clearly, the public purchase of scenic or environmental easements can be expected to alter the pattern of development in the region in which the easements are established. However, the effect of the establishment of the easements upon the growth of this region in the aggregate invariably constitutes an empirical issue which cannot be definitively resolved solely on the basis of theoretical analysis.

The impact of the public purchase of scenic or environmental easements upon the stability of land use will be determined by the extent to which the restrictions specified in the easements preclude the pursuit of activities which actually would have been performed in the absence of the easements. However, unless the easements which are established require the discontinuation of activities which are already being performed on the properties to which these easements are applied, the directly observable effects of the establishment of scenic or environmental easements upon the stability of land use will be negligible.

#### 5.6 Landowner Development Corporations

The attainment of the socially optimal allocation of resources is severely threatened by the existence of externalities because the individual resource owners whose activities generate these externalities have no direct motivation to recognize or, more importantly, to incorporate into their decision-making processes the external costs which these activities impose upon other members of society. However, theoretically, these problems of unreconciled interdependencies among economic activities can be resolved through the merger of all of the individuals who are affected by any externality into a single decision-

making unit which has the authority to determine the allocation of all resources which affect the generation of the externality. Since this decision-making unit will obtain all of the gains associated with the provision of a more socially desirable allocation of resources and will incur all of the costs associated with the provision of a less socially desirable allocation of resources in this externality situation, it will be motivated to incorporate all of the costs and benefits attributable to its activities into its resource allocation decisions and, hence, to provide an allocation of resources which unambiguously promotes the attainment of social optimality.

The formation of a landowner development corporation constitutes an attempt to apply this merger strategy to the control of those externalities which are generated by the activities performed on land. Conceptually, by unifying within a single decision-making unit the authority to control the use of all of the parcels of land which might potentially be involved in a particular externality situation, a corporation of this type can be expected to incorporate appropriately into its decision-making those interdependencies among land use activities which cause the unrestricted market to produce an economically inefficient and, hence, socially suboptimal pattern of land use. Specifically, since the restriction of activities which generate external costs and the expansion of activities which provide external benefits will increase the values which the users and potential users of externally affected parcels of land attach to these properties and since competition among these individuals will translate these increased personal valuations of these properties into increased market values for these properties, the appropriate control of externalities by this corporation will produce total returns to all of the properties involved in the externality situation which exceed the total returns which these properties would have earned in the absence of the control of these externalities. If these additional total returns exceed the total cost of establishing and administering the landowner development corporation, this corporation simultaneously can both unambiguously promote the attainment of social optimality and provide an incentive for each of the individuals who are affected by the externalities to become shareholders in the corporation (i.e., transfer control of the utilization of the properties involved in the externality situation to the corporation in exchange for shares in the corporation) by distributing the additional net returns earned by these properties as a result of the corporation's control of externalities (i.e., the additional total returns earned by these properties in excess of the costs of administering the corporation) among these individuals in a manner which guarantees that none of the individuals experiences a lower level of

personal welfare when the corporation controls the generation of externalities than he would have obtained in the absence of this control.

However, it is important to recognize that, to achieve this unambiguously socially desirable result, the landowner development corporation must perceive and appropriately incorporate into its decision-making processes the costs and benefits which its decisions will generate for all of the individuals who are involved in the externality situation. Thus, to control effectively all of the externalities which arise from the use of land, this corporation not only must promote the personal welfare of all owners of developable property within the geographic area in which the externalities arise, but also must protect or advance the interests of all other property owners and other individuals whose personal welfare is affected by the generation of the externalities. The most direct method to assure that these conditions are fulfilled is to include all of these individuals as shareholders in the corporation. Only if each individual who incurs costs or obtains benefits in the externality situation is included as a shareholder in the corporation is there any automatic assurance that the personal welfare of all of these individuals will be considered in the corporation's decision-making.

#### 5.6.1 Information Requirements and Expected Deviations from Social Optimality

If all of the individuals who are involved in the externality situation are included as shareholders in the corporation, the appropriate control of the externalities which are attributable to the use of land within the geographic area administered by the corporation can be performed in a reasonably straightforward manner if the sole objective of each of these shareholders is the maximization of the financial return on his investment in the corporation. In this case, the objective of the landowner development corporation is simply the maximization of the total financial return earned by the property whose utilization it controls. The information required to perform this maximization consists of merely the reasonably predictable rental values which the properties administered by the corporation will command in the market when each of the various land use patterns which might be developed by the corporation actually prevails, the cost of providing the private facilities required to achieve each of these patterns of development, and the cost of providing public facilities to serve each of these various land use patterns (which the corporation will recognize and incorporate into its decision-making processes because the corporation pays all of the property taxes which finance the provision of these facilities). Although

the practical difficulties associated with assembling and assimilating this information in producing land use decisions undoubtedly will be considerable, they should be no greater, and probably will be less, than the problems which would confront any public agency which might attempt to regulate the uncoordinated use of these properties by all of the individuals who are involved in the externality situation.

However, the complexity of determining the socially optimal allocation of activities to parcels of land increases substantially in the more common case where some of the individuals who are involved in the externality situation are interested in maximizing the satisfaction which they obtain from the use of land rather than just the financial return which they earn on their investment in land. Under these circumstances, the appropriate control of the externalities arising from the use of land requires not only information concerning the market values of parcels of land when different patterns of development prevail, the cost of providing the private facilities required for these patterns of development, and the cost of providing public facilities to serve these patterns of development; but also information concerning the personal valuations which the various individuals who are involved in the externality situation attach to these different development patterns.

Whenever this information concerning personal valuations is required, the landowner development corporation can adopt either of two basic strategies to elicit this information for inclusion into its decision-making processes. First, the corporation can develop a decentralized decision-making structure which relies upon the attainment of negotiated settlements among its shareholders to determine the socially optimal pattern of development. However, any attempt to achieve an unambiguously socially desirable privately negotiated settlement among all of these shareholders will encounter precisely the same technical and motivational difficulties which the analysis in Section 5.4 has demonstrated will impede the attainment of unambiguously socially desirable publicly negotiated settlements among all of the individuals who are affected by any particular externalities. Alternatively, the corporation can develop a centralized decision-making structure which relies upon estimates of these personal valuations of patterns of development as informational inputs into its determination of the socially optimal pattern of development. However, any attempt to obtain reasonably accurate estimates of these personal valuations will encounter precisely the same technical and motivational difficulties which the analysis in Section 5.5.2 has demonstrated will inhibit the generation of reasonably accurate estimates of personal valuations in the context of the public

purchase of scenic or environmental easements. Consequently, under either of these decision-making strategies, it is extremely unlikely that the landowner development corporation will be successful in identifying the socially optimal pattern of development.

Moreover, recognizing the large number of individuals who are affected by many of the externalities which are attributable to the development and use of land, it will frequently be impossible to enlist all of these individuals as shareholders in a landowner development corporation. Rather, it appears more likely that, at best, this corporation will successfully attract as shareholders only those individuals who own property or reside within the geographic area in which the externalities are generated; and that, more frequently, it will succeed in enlisting as shareholders only those individuals who own developable property within this area.

Whenever a landowner development corporation fails to include as shareholders all of the individuals who are involved in any externality situation, the attainment of social optimality in this situation requires that the corporation, in making its decision, must recognize and appropriately account for all external costs and benefits which its actions impose upon individuals who are not shareholders in the corporation. However, since the shareholders of the corporation will absorb all of the costs and obtain none of the benefits associated with incorporating these external costs and benefits into the corporation's decision-making processes, these shareholders will have no direct motivation to encourage the corporation to consider these external costs and benefits in its decision-making. Therefore, unless the corporation behaves in a manner which is inconsistent with the advancement of the interests of its shareholders, the pattern of development which is established by the corporation when it fails to include as shareholders all individuals who are involved in the externality situation can be expected to deviate to some extent from the socially optimal pattern of development.

#### 5.6.2 Potential Inequities, Abuses, and Enforcement Problems

If a landowner development corporation does not include as shareholders all of the individuals who are affected by the externalities which the corporation is attempting to control, the actions taken by the corporation can, in general, be expected to provide increases in personal welfare for its shareholders and to impose decreases in personal welfare upon (or, at least, to fail to provide attainable increases in



personal welfare to) those individuals who are involved in the externality situation but are not shareholders in the corporation. Moreover, unless the corporation initiates actions only on the basis of mutually agreeable negotiated settlements among all of its shareholders, the actions taken by the corporation can be expected to provide increases in personal welfare to some of its shareholders and to impose decreases in personal welfare to other shareholders in many instances. Thus, if the corporation relies upon either a decentralized decision-making process which requires less than the unanimous approval of all shareholders as authorization for the initiation of any action or a centralized decision-making process which bases its decisions upon unavoidably inaccurate estimates of the personal valuations of its shareholders, some inequities can be expected to be observed in the differential impacts which its actions have upon the personal welfare of its various shareholders. In addition, since the actions taken by the corporation (especially the distribution of the additional net returns which are earned, as a result of the corporation's control of externalities, by the properties whose utilization is controlled by the corporation) directly affect the wealth of the shareholders of the corporation, motivations will exist for individual shareholders to offer bribes to the administrators of the corporation to induce these administrators to initiate actions which will increase their personal wealth -- regardless of the effect of these actions upon other shareholders or other individuals who are involved in the externality situation. Obviously, if bribes of this type are accepted and acted upon by the administrators of the corporation, systematic, intentional inequities will be established both among the shareholders of the corporation and among all of the individuals who are involved in the externality situation.

Finally, and more importantly, it must be recognized that the same consolidation of control which provides to a landowner development corporation the power to internalize the externalities which arise among the various land use activities within a geographic area also provides to this corporation the power to exercise monopoly control over the development of land in this area. Thus, in the absence of any public regulation of its actions, a landowner development corporation will be motivated to increase the net return which will be earned by the property which it controls by taking advantage of the less than perfect elasticity of the total market demand for this property. At the extreme, if the corporation is capable of practicing perfect price discrimination against all users of the property (i.e., if it is able to identify and extract from each of these individuals the maximum amount of income which this individual is willing to pay for the use of the property), the

corporation will continue to provide the same economically efficient pattern of development which it would have provided if it had not attempted to exercise its monopoly power to any extent, but it also will produce a substantial redistribution of wealth from the users of its property to the shareholders of the corporation. However, to exercise perfect price discrimination, the corporation must acquire perfect knowledge of the personal valuations which the various potential users of the property attach to the different patterns of development which might be established on the property. Yet, to the extent that these potential users realize that their revelations of their personal valuations of these various patterns of development will directly affect the amount of income which the corporation will require them to surrender to obtain the right to use the corporation's property, these potential users will rationally understate their personal valuations of these patterns of development. Consequently, it will inevitably be true, in practice, that the landowner development corporation will be unable to obtain sufficiently accurate estimates of the personal valuations of the potential users of its property to be able to practice perfect price discrimination against these individuals.

Therefore, in general, the landowner development corporation will discover that, to maximize the net return which can be earned by its property in practice, it will be necessary to induce the users of the property to make larger payments for the right to use the property by restricting the development of the property below the level of development which would have been undertaken in the absence of any exercise of monopoly power. In particular, it will be possible to increase the total net return which can be earned by the property by restricting its development in a manner which will increase the return earned by the portion of the property which the corporation continues to develop more than it decreases the return earned by the portion of the property which the corporation chooses not to develop. However, any restriction of development of this type will be economically inefficient in the sense that, relative to this restricted level of development, there will exist some expansions of development for, which some potential users of the corporation's property would be willing to pay an amount of income in excess of the cost which society must incur in performing the expansion of development. Thus, in general, the exercise of monopoly power by a landowner development corporation will precipitate the socially undesirable exclusion of some potential users from access to the

property controlled by the corporation and, hence, will fail to promote unambiguously the attainment of social optimality.\*

To forestall this outcome, public regulation of the potentially monopolistic behavior of the corporation will be required. For this regulation to promote unambiguously the attainment of social optimality, the public agency which is responsible for the administration of the regulation must assemble and analyze sufficient information to identify those instances in which the behavior of the landowner development corporation is inconsistent with the attainment of the socially optimal pattern of development of the property controlled by the corporation. In general, this information will consist of essentially the same information which would be required to develop a mechanism to control the generation of externalities among the activities performed upon the property directly. Consequently, there is no clear advantage associated with the public sector's permitting the formation of and, then, regulating the behavior of a landowner development corporation in any externality situation, instead of controlling the generation of externalities directly in this situation. Rather, the relative social desirability of these alternative public policies must be determined empirically by balancing the comparative success of these policies in promoting the development of socially desirable land use patterns against the comparative levels of total cost which must be incurred in administering these policies.

#### 5.6.3 Legal Constraints and Political Acceptability

The primary legal barrier confronting the formation of landowner development corporations consists of the antitrust and antimonopoly

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\*These inequities will not arise if all individuals who might be affected by the use of land within any geographic area -- including potential residents and other potential users of land in the area -- are included as shareholders in a landowner development corporation which requires the mutual agreement of all shareholders as authorization for the adoption of any decision which restricts development. Under these circumstances, any individual who might be damaged by any exercising of monopoly power will be able to forestall this exercising of monopoly power. However, in practice, it appears to be extremely unlikely that any landowner development corporation could either successfully enlist all of these individuals as shareholders or establish a productive decision-making process which contains such stringent safeguards.

statutes of the Federal government and the various state governments. If the courts' interpretations of these statutes consider the merger within a single decision-making unit of the authority to control the utilization of all property within a particular geographic area to constitute the formation of an illegal combination in restraint of trade, the feasibility of establishing landowner development corporations obviously will be severely challenged.

Moreover, even if these legal barriers either prove to be illusory or can be overcome, the formation of a landowner development corporation must be politically acceptable to the constituents of the political jurisdiction in which its establishment is proposed before this jurisdiction will permit its establishment. To the extent that these individuals consider a landowner development corporation to constitute a unique and unprecedented mechanism for the control of externalities, its political acceptance by these constituents will require the exertion of substantial public relations efforts by its proponents.

In addition, to the extent that the formation of a corporation of this type can be expected to provide net benefits to some of these constituents and to impose net costs upon other constituents, the overall political acceptability of this control mechanism will be determined to some extent by the relative political influence of those constituents who will obtain net benefits from its adoption and those constituents who will incur net costs as a result of its adoption. Thus, for example, if it is perceived that the formation of a landowner development corporation which includes as shareholders only the owners of property within a particular political jurisdiction might exercise its control over the development of property within the jurisdiction solely to the advantage of its shareholders and, hence, to the disadvantage of the renters of property within the jurisdiction, the overall political acceptability of the formation of the corporation will be strongly influenced by the relative political influence of the property owners and renters in the political jurisdiction. Clearly, under these circumstances it is impossible to derive any general conclusions about the potential political acceptability of landowner development corporations in all political jurisdictions.

#### 5.6.4 Expected Impacts on Land Use Patterns

To the extent that the actions taken by a landowner development corporation reduce both the external costs which are generated by the activities which are performed upon the property whose utilization it

controls and the cost of providing public facilities to serve the property, these actions should encourage an expansion of development undertaken on the property. Conversely, to the extent that the corporation exercises its monopoly power to increase the net return earned by the property which it controls, the actions taken by the corporation will restrict development on the property. Consequently, the expected impact of the formation of a landowner development corporation in any particular area upon the overall rate of growth of the area constitutes an empirical issue which cannot be resolved solely on the basis of theoretical analysis. Nevertheless, it can be asserted that the more effective is the government's regulation of the monopolistic tendencies of any landowner development corporation, the greater will be the tendency of the landowner development corporation to take actions which will encourage the overall growth of the area in which it operates.

In addition to affecting the overall level of development within a geographic area, the formation of a landowner development corporation can be expected to influence the pattern of development in the area. In particular, the actions taken by any corporation of this type can be expected to avoid the development of mixtures of land use activities which impose substantial external costs upon its shareholders and to expand the development of mixtures of land use activities which provide substantial external benefits for these shareholders. Similarly, the corporation can be expected to develop land use patterns which economize on the cost of providing public facilities to serve the activities incorporated within these patterns. Nevertheless, since the landowner development corporation's primary objective is the maximization of the net return earned by the property whose utilization it controls, it appears unlikely that these modifications of the pattern of development will be abrupt or destabilizing. Rather, the corporation can be expected to perform these modifications in a coordinated manner calculated to preserve and enhance these net returns.

#### 5.7 Required Payment by New Developments of Full Additional Cost of all Public Facilities

If each property owner who develops his property is required to pay the full additional cost of all expansions of public facilities which must be provided to serve this development, a property owner will choose to develop his property only if the total return which he expects to obtain from this development exceeds the private cost which he incurs

in performing the development by more than this full additional cost. Conversely, he will choose to forego this development if this total return exceeds his private development cost by less than this amount. Thus, if either there exist no externalities between private land uses or those externalities which do exist between private land uses have been optimally controlled by other public or private actions, a policy which requires the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments should induce property owners to introduce all land use activities which will generate total returns in excess of the total private and public costs of developing these activities, and should discourage property owners from initiating any land use activities which will generate total returns less than these total private and public costs. Hence, if this requirement can be effectively implemented, this policy should unambiguously promote the attainment of the socially optimal pattern of development.

#### 5.7.1 Information Requirements

Unfortunately, the effective implementation of the requirement that the owner of any new development must pay the full additional cost of all expansions of public facilities which must be provided to serve this development is severely hampered by the empirical difficulties associated with the estimation of this full additional cost. This estimation would cause no problems if all public facilities could be expanded in arbitrarily small increments such that the cost of providing each incremental unit of any particular public facility is constant and each incremental unit of each public facility provides services to only one development. If these conditions were fulfilled, the attainment of the socially optimal pattern of development could be unambiguously promoted by merely determining the cost of providing an incremental unit of each public facility and, then requiring property owners to pay a price equal to this cost for each unit of the public facility which is provided to serve their developments.

However, these conditions generally are not fulfilled for public facilities. Rather, the expansions of public facilities which must be provided to serve particular new developments frequently are characterized by indivisibilities in supply and jointness in consumption which cause the provision of these additional public facilities to exhibit increasing returns to scale. Although it is impractical to attempt to enumerate all of the problems which can be expected to arise in the estimation of the full additional cost of expanding each public facility

which is provided to serve each new development in any realistic situation in which increasing returns to scale prevail, a reasonable appreciation of the magnitude of these difficulties can be obtained from the consideration of a simplified example.

Therefore, consider the problem of providing sewerage to serve all of the land use activities which are developed within a particular geographic area. Assume initially that all of these land use activities are initiated simultaneously and that the topographic characteristics of the geographic area preclude the extension beyond this area of the sewerage system which is installed to serve the developments within the area. Although it probably would be technically feasible to install a separate sewer line connecting each of these developments to the regional sewage treatment facility, it almost invariably will be possible to attain a lower level of total cost in providing this same level of total sewerage service to the geographic area by installing a unified system consisting of a single trunk sewer line with sufficient capacity to transport all of the sewage generated by all of the developments in the area to the regional sewage treatment facility and a set of smaller individual sewer lines which connect each of these developments to the trunk sewer line.

However, unfortunately, this unified sewerage configuration introduces substantial complexity into the measurement of the full additional cost of providing sewerage service to each of these developments. Clearly, the cost of installing the individual sewer line which connects any of these developments to the trunk sewer line constitutes a component of the full additional cost of providing sewerage service to this development; and, hence, this cost component constitutes a lower bound upon the charge which must be imposed upon the owner of this development in attempting to recover the full additional cost of providing the development's sewerage service.

Yet, the provision of sewerage service to this development also involves the installation of the trunk sewer line which serves all of the developments in the geographic area; and the cost of installing the trunk sewer line constitutes a component of the full additional cost of providing sewerage service to all of these developments. Unfortunately, the cost of installing the trunk sewer line is a joint cost of all of the developments which generally cannot be systematically allocated among the developments in a manner which will unambiguously promote the attainment of social optimality purely on the basis of the physical or technological characteristics of the sewerage system. Rather, to promote

the attainment of social optimality, the cost of installing the trunk sewer line must be allocated among the individual developments which it serves in a manner which guarantees that the portion of this cost which is allocated to each of the developments does not exceed the value of the total benefit which the owner of the development obtains from the provision of the trunk sewer line (i.e., the difference between the value of the total benefit which the property owner obtains from the provision of its complete sewerage service and the cost of installing the individual sewer line which connects his development to the trunk sewer line).\*

For a property owner whose sole objective is the maximization of the profit which he earns on his investments, the value of the total benefit which he obtains from the provision of this sewerage service to his development is equal to the difference between the financial return which he would earn from this development if the sewerage service were provided free of charge and the financial return which he would earn from his best alternative investment opportunity. Similarly, for a property owner whose objective is the maximization of his satisfaction (e.g., the owner-occupant of a residential property), the value of this total benefit is equal to the difference between the consumer's surplus which he would obtain from his development if the sewerage system were provided free of charge and the consumer's surplus which he would obtain from his best alternative market opportunity. Consequently, the determination of the upper bound on the portion of the total cost of installing the complete sewerage system which can be imposed upon the owner of each development which will be served by the sewerage system while unambiguously promoting the attainment of social optimality requires either the estimation of the revenues which will be obtained and the costs which will be incurred by this property owner from both this development and his best alternative investment opportunity if his sole objective is the maximization of his profit or the estimation of the personal value which will be obtained and the costs which will be incurred by this property owner from both this development and his best alternative market opportunity if his objective is the maximization of his utility.

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\*Obviously, if an allocation of the cost of installing the trunk sewer line which fulfills this condition can be developed, it will necessarily be true that the total benefits which are obtained by all of these developments as a result of the provision of this sewerage system will exceed the total cost of providing the system; and, hence, the provision of the sewerage system will unambiguously promote the attainment of social optimality.



Although, in general, it should be possible to obtain reasonably accurate estimates of both the revenues which will be generated by any particular development or any other investment opportunity and the costs which must be incurred in performing any particular development or pursuing any other investment opportunity or market opportunity, technical and motivational problems may preclude the obtaining of any reasonably accurate estimates of property owners' personal valuations of either physical developments on real property or other market opportunities. The provision of adequate estimates of personal valuations normally requires detailed knowledge of a property owner's tastes and preferences -- knowledge which he commonly will have no motivation to divulge accurately to the administrative agency responsible for the provision and financing of sewerage services. Rather, to the extent that his revelations of his personal valuation of either a particular development or any other market opportunity can be expected to influence the charge which he will be required to pay for the sewerage services which serve the development, it will be rational for any property owner to under state his personal valuation of the development and to overstate his personal valuations of all alternative market opportunities. Consequently, the best obtainable estimate of the total benefit which a utility maximizing property owner will obtain from the provision of sewerage service to the development on his property usually will be relatively crude; and, hence, it will almost invariably be impossible to guarantee that any particular allocation of the cost of installing any trunk sewer line will unambiguously promote the attainment of the socially optimal pattern of development.

Moreover, the difficulties associated with obtaining adequate estimates of the full additional cost of providing sewerage service to any particular development which have been delineated in this example will increase substantially in magnitude if the simplifying assumptions of the simultaneous development of all properties served by the sewerage facility and the impossibility of expanding the geographic area served by this facility are relaxed. The relaxation of these assumptions introduces the additional problems of predicting the nature, timing, and pattern of the development which will occur within the geographic area which might be served by the sewerage facility; determining the appropriate amount of excess sewer capacity to provide at any point in time to support the anticipated future development; and establishing a socially desirable policy for financing the provision of this excess capacity.

Despite the introduction of these additional problems, the unambiguous promotion of the attainment of social optimality still requires

that the sewerage facilities which are installed in any area at any point in time must be financed in a manner which imposes a charge upon the owner of each development served by these facilities which does not exceed the total benefits obtained by this property owner from the provision of these facilities to his development. However, the information which is required to guarantee that the provision of any particular sewerage system will fulfill this condition is substantially greater than the information which is required to serve this purpose in the more restrictive situation which has already been analyzed. Specifically, in this more realistic situation, it is necessary, first, to forecast both the type of development which will be introduced upon each parcel of land which will be served by the sewerage system and the point in time at which this development will be introduced and, then, to estimate the values of the previously described costs, revenues, and personal valuations which can be expected to be associated with each of these developments if the predicted nature and timing of the development actually prevails. Therefore, the possibility of guaranteeing that any particular allocation of the cost of installing a sewerage system will unambiguously promote the attainment of social optimality decreases systematically as the complexity and reality of the situation in which the sewerage system is being provided increases.

In addition, obviously, these same empirical difficulties will arise to a greater or lesser extent in any attempt to determine an allocation of the total cost of providing any other type of public facility (e.g., municipal water supply, public streets and roads, electricity generation and distribution, telephone service, natural gas supply, solid waste disposal, police protection, fire protection, or, even, educational services) among the owners of all of the developments which are served by the facility in a manner which will unambiguously promote the attainment of the socially optimal pattern of development. Therefore, it will generally be impossible to develop an allocation of the total cost of providing any public facility which can be uncontestably demonstrated to promote unambiguously the attainment of social optimality.

Yet, if the value of the total benefits which are obtained by society from the provision of any public facility exceeds the total costs which are incurred by society in providing the facility, there will exist an infinite number of different allocations of these total costs which will unambiguously promote the attainment of social optimality. Therefore, for any public facility whose provision generates total benefits whose value to society is greater than the total cost of its provision, some possibility exists that an unambiguously socially desirable allocation of

this cost can be derived from the available information concerning the value of the public facility to the owners of the developments which it serves.

#### 5.7.2 Expected Deviations from Social Optimality

Nevertheless, for any allocation of the cost of providing a public facility among the owners of the developments which are served by the facility which has been established on the basis of less than perfect information, there inevitably will exist some possibility that the imposition of this cost allocation will exert some socially undesirable influences upon the pattern of development. In particular, in the context of the example developed in the preceding section, if the provision of a certain sewerage system is financed through a cost allocation which imposes upon each owner of a development which is served by the system a charge which is equal to the cost of installing the individual sewer line which connects his development to the trunk sewer line, this financing mechanism will precipitate the provision of a socially undesirable sewerage system if the value of the total benefit which is obtained by each of these property owners as a result of the provision of the sewerage system exceeds the charge which is imposed upon this property owner and if the total cost of providing the system exceeds the value of the total benefits which are obtained by all of these property owners from the sewerage system.

Conversely, if the provision of the sewerage system is financed through a cost allocation which imposes upon each of these property owners a charge which exceeds the cost of installing the sewer line which connects his development to the trunk sewer line, this financing mechanism will preclude the establishment of a socially desirable development if the charge which is imposed upon the owner of this development exceeds the value of the total benefit which he obtains from the provision of sewerage service to the development and if the value of this total benefit exceeds the cost of installing an individual sewer line connecting his proposed development to the trunk sewer line and if the value of the total benefits which are obtained by the owners of all of the developments which are served by the sewerage system exceeds the total costs of providing the system. Moreover, it is possible that, in some instances, a financing mechanism of this type will simultaneously precipitate the provision of a socially undesirable sewerage system and preclude the establishment of some developments which are socially desirable given that this sewerage facility has been provided. These

results will be observed if the value of the total benefit which is obtained from the sewerage system by each owner of a development which eventually is served by the sewerage system exceeds the charge which is imposed upon this property owner and if the value of the total benefit which would have been obtained from the sewerage system by any owner of a property upon which development has been precluded by this financing mechanism is both less than the charge imposed upon this property owner and greater than the cost of installing an individual sewer line connecting his prospective development to the trunk sewer line and if the value of the total benefits which would have been obtained from the sewerage system by all of the property owners whose individual developments are potentially socially desirable is less than the total cost of providing the system.

Thus, in any realistic situation, the possibility clearly exists that the adoption of any policy which attempts to require the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments will induce the establishment of a pattern of development which deviates to some extent from the socially optimal pattern of development.

#### 5.7.3 Potential Inequities, Abuses, and Enforcement Problems

Obviously, any allocation of the cost of providing an expansion of a public facility which precludes the establishment of some socially desirable developments will create inequities among the owners of the various properties which might be served by this expansion to the extent that this cost allocation will deny potentially attainable benefits to the owners of the precluded developments while permitting the owners of those developments which are undertaken to retain at least some portion of their potentially attainable benefits. In fact, even if an allocation of the cost of providing any particular expansion of a public facility which unambiguously promotes the attainment of social optimality is successfully imposed upon the owners of the developments served by the expansion, this cost allocation might be considered to be inequitable to the extent that it extracts from different property owners different portions of the values of the total benefits which these individuals obtain as a result of the expansion (e.g., if it extracts all of the values of these benefits from some property owners while permitting other property owners to retain substantial portions of the values of their benefits).

Similarly, in any situation in which the timing of development causes the provision of excess capacity of some public facility during some time periods to be potentially socially desirable, the manner in which the carrying costs associated with the provision of this excess capacity are allocated among the owners of developments which are introduced at different points in time may create inequities in the treatment of these property owners. In addition, since the particular allocation of the cost of providing any expansion of any public facility which is imposed upon the owners of the developments served by the expansion will directly affect the wealth of these property owners, motivations will exist for each of these property owners to offer inducements to the public officials who are responsible for the establishment of this cost allocation to encourage the adoption of a cost allocation which is favorable to his interest. Whether these inducements assume the form of the direct payment of bribes or the oblique exercise of political influence, if they are successful in producing a modification of the allocation of the cost of providing the extension which is adopted by these public officials, these inducements will necessarily affect the equity of the manner in which the net benefit attributable to the provision of the expansion are distributed among the owners of the developments which it serves.

#### 5.7.4 Legal Constraints and Political Acceptability

The legal constraints which can be expected to confront any political jurisdiction which desires to implement a policy requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which serve their developments can be inferred from the legal constraints which presently confront political jurisdictions which impose subdivision exactions upon property owners who wish to subdivide their properties prior to development or sale. Essentially, a subdivision exaction consists of a requirement that any property owner desiring approval of a proposed subdivision plan must either dedicate portions of his property to the municipality as sites for public facilities or directly install certain public facilities upon his property or make monetary payments to the municipality in lieu of either the dedication of property or the direct installation of public facilities before this approval will be granted.

To gain the approval of the courts, a subdivision exaction must be determined to constitute a legitimate police power regulation. Thus, the subdivision regulation which provides for the exaction must be

authorized by enabling legislation and must reasonably promote the health, safety, morals, or general welfare of the community upon which the regulation is imposed. If the regulation fails to fulfill these requirements, the imposition of this subdivision exaction upon any property owner will constitute a violation of the property owner's right to receive just compensation for property which is confiscated by the government. Under these circumstances, unless the court determines that the exaction actually has been performed voluntarily by the property owner,\* the property owner will be entitled to the reimbursement of any expenditures which he has made in installing public facilities and the restitution of any property which he has dedicated to the municipality to satisfy the invalid regulation.

Moreover, in addition to these police power requirements, two other potential restrictions upon any political jurisdiction's ability to impose subdivision exactions should also be mentioned. First, if a court which recognizes exclusionary tactics determines that the subdivision exactions which are established by a municipality have been designed to increase the cost of development so greatly that they will effectively exclude a substantial number of prospective residents from the municipality, the court may declare the exactions to be invalid. Second, if the subdivision exactions which are imposed by a municipality are determined by the court to be discriminatory in a manner which violates the equal protection clause of either the Federal constitution or the relevant state constitution, the exactions may be declared to be invalid.

Nevertheless, despite these considerable legal requirements, the courts have permitted political jurisdictions to impose subdivision exactions in numerous situations. In particular, the courts have generally permitted municipalities to require a subdivider to improve the streets within his subdivision and, then, to dedicate the improved streets to the municipality.\*\* Moreover, a subdivider generally may be compelled to supply sewerage, water, and drainage facilities to serve his subdivision. In fact, some courts have declared that the

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\*Gregory Manor vs. City of Clifton, 53 N.J. Super. 482, 147 A.2d 595 (1959).

\*\*See cases cited in Rathkop (81) at 71-55 n. 9.

installation of these facilities by the subdivider may be required by the municipality even in situations in which the subdivider must construct some facilities outside of the boundaries of his subdivision to fulfill the stipulations of the regulation.\* Similarly, some cases have permitted municipalities to require that telephone and electrical transmission lines must be installed underground.\*\*

However, the receptiveness of the courts to the imposition of subdivision exactions for either recreational or educational purposes is less widespread. Some states have provided statutory authorization for the dedication of land for recreational purposes;\*\*\* and, hence, some courts have permitted municipalities to require the dedication of land for these purposes.\*\*\*\* However, other states have provided statutory authorization which merely permits political jurisdictions to require subdividers to reserve land for recreational purposes so that these political jurisdictions may eventually purchase this property by exercising their power of eminent domain.\*\*\*\*\* The mere reservation of land does not require a subdivider to bear any significant portion of the cost of providing a proposed recreational facility, since he will be compensated for the value of the land which is reserved when the political jurisdiction condemns the property.

Even greater difficulties confront any attempt to impose subdivision exactions for educational purposes. In fact, in one New Jersey case, the court has strongly indicated that all education facilities must be financed by the general public. Specifically, this court has declared:

It is the duty of the municipality to educate our citizenry;  
to build schools, equip and maintain them for such purposes.  
The cost for public education, in a democratic society, must

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\*Johnson vs. Benbrook Water and Sewer Authority, 410 S. W. 2d 644 (Tex. Civ. App. 1967) and Rounds vs. Board of Water and Sewer Commissioners, 347 Mass. 40, 196 N. E. 2d, 209 (1964).

\*\*Brazor vs. Borough of Mountainside, 55 N. J. 456, 262 A. 2d 857 (1970), and Sansoucy vs. Planning Board of Worcester, 246 N. E. 2d 811, 355 Mass. 647 (1969).

\*\*\*See, for example, Conn. Gen Stat. § 8-25.

\*\*\*\*Billings Properties, Inc. vs. Yellowstone County, 144 Mont. 25, 394 P. 2d 182 (1964). See also the cases discussed in 43 A. L. R. 3d 862.

\*\*\*\*\*See, for example, Md. Gen. Laws Ann. § 66B-26A.

be borne by the public and the funds to be used for such purpose must be raised by public taxation. . . . It is my opinion that any attempt to compel a developer to pay for building a school, or to donate land for a school, as a condition precedent to giving. . . . approval to a subdivision is violative of his constitutional rights.\*

Nevertheless, one court has permitted a municipality to require the dedication of land for educational and recreational purposes.\*\* However, at the present time, it appears that no court has ruled upon a case concerning a subdivision exaction requiring a subdivider to construct an educational facility. Thus, case law will presently not support a subdivision regulation which requires a subdivider to build a school upon his property.

Finally, one additional problem arises in the imposition of subdivision exactions if a municipality desires to require a subdivider to pay a fee in lieu of the dedication of land or the installation of a public facility instead of requiring him to perform either of these other actions. A fee of this type is not a general tax. Rather, it is more like a special assessment. Consequently, like a special assessment, the use of the fee must confer a special benefit upon the party from whom it is collected, although it does not have to fulfill the constitutional requirement of uniformity which a general tax must satisfy. The requirement that the revenue obtained from the imposition of a fee in lieu of the dedication of land must be used to benefit the property owners from whom the fee is collected has precipitated the invalidation of fees of this type in some instances. For example, in Aunt Hack Ridge Estates, Inc. vs. Planning Commission of Danbury, \*\* the court declared a fee to be unconstitutional because the revenues generated by the fee were used to provide recreational facilities which would benefit the entire community rather than just the property owners who were required to pay the fee. Nevertheless, other courts have permitted the imposition of fees in lieu of the dedication of land when definite standards have been established for the imposition of the fees and when

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\*Midtown Properties, Inc. vs. Madison Township, 68 N. J. Super. 197, 172 A.2d 40, 47, (1961).

\*\*Jordan vs. Menomonee Falls, 28 Wis. 2d 608, 137 N. W. 2d 442 (1965).

\*\*\*27 Conn. Supp. 74, 230 A.2d 45 (1967).



the facilities financed by the fees have been demonstrated to benefit the individuals from whom the fees have been collected.\* In fact, in Jordan vs. Village of Menomonee Falls,\*\* the court has substantially extended the range of circumstances in which the imposition of fees in lieu of the dedication of land might be determined to be judicially acceptable. In this case, the court has been confronted with a municipal ordinance which permits the imposition of a fee of \$200 per lot in lieu of the dedication of land if this dedication is not feasible or compatible with municipal plans. Part of the revenue generated by the imposition of this fee is designated for the provision of recreational facilities; while the remainder of this revenue is reserved for use by the school district. The court has upheld the validity of this fee despite the absence of any specific authorization for the imposition of a fee of this type in any enabling legislation, on the grounds that the fee constitutes a necessary component of the municipality's dedication procedures. Moreover, the court has also declared that, because payment of the fee constitutes a requirement for subdivision approval, the fee is not a tax and, hence, does not have to fulfill the requirements which are applicable to special assessments. Clearly, to the extent that courts generally accept the precedents established in this decision, the range of application of fees in lieu of the dedication of land will be greatly expanded.

Nevertheless, this range of application will still be constrained by the legal restrictions which limit the general ability of political jurisdictions to impose any form of subdivision exaction. Consequently, it appears unlikely that the imposition of fees in lieu of the dedication of land will ever be legally capable of requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments. Yet, since the establishment of a new development, in general, will precipitate increases in both the assessed value of the property on which the development is established and, hence, the total property tax imposed upon this property, the sum of this increase in the total property tax and any fees which can legally be imposed may permit the municipality to recover a substantial portion of this full additional cost.

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\*Associated Home Builders vs. Walnut Creek, 4 Cal. 3d 633, 94 Cal. Rptr. 630, 484 P.2d 606 (1971) and Jenad, Inc. vs. Scarsdale, 18 N. Y. 2d 78, 271 N.Y.S. 2d 955, 218 N. E. 2d 673 (1966).

\*\*28 Wis. 2d 608, 137 N. W. 2d 442 (1965).

Yet, for a policy which requires owners of new developments to pay the full additional costs of all expansions of public facilities which must be provided to serve these developments to be adopted by a municipality, the policy must be politically acceptable within this municipality. Since the adoption of a policy of this type will provide net benefits to some constituents of the municipality (e.g., most taxpayers whose total tax burdens will decrease as a result of the implementation of the policy) and will impose net costs upon other constituents of the municipality (e.g., the owners of property which are potentially suitable for development), the political acceptability of any policy of this type will be strongly influenced by the relative political influence of those constituents who obtain net benefits from its adoption and those constituents who incur net costs as a result of its implementation. Moreover, the greater is the extent to which a comprehensive policy of this type is considered by the constituents of a municipality to be similar to existing subdivision exaction requirements, the greater is the likelihood that the policy will be acceptable to these constituents.

#### 5.7.5 Expected Impacts Upon Land Use Patterns

Since any policy which requires the owners of new developments to pay the full additional costs of all extensions of public facilities which must be provided to serve these developments imposes charges only upon property owners who establish new developments, the initial implementation of a policy of this type should not precipitate any substantial modifications in the prevailing land use pattern. Rather, to the extent that the adoption of this policy causes the owners of properties which are potentially suitable for development to recognize and incorporate into their decision-making costs which they would have ignored in the absence of this policy, the policy will discourage the establishment of some developments which otherwise would have been undertaken. Thus, relative to the pattern of development which would have prevailed in the absence of this policy, the adoption of this policy can be expected to limit the overall rate of growth of the municipality in which the policy has been established. Moreover, since the charges imposed upon the owners of new developments under this policy can be expected to discourage the establishment of developments which would have competed with and, possibly, supplanted the land uses which have been established prior to the adoption of this policy, the policy can also be expected to increase the temporal stability of these pre-existing land uses.

## 5.8 The Most Appropriate Level of Government to Implement Any Policy

Theoretically, it is most socially desirable to assign the responsibility for the administration of any public policy to the lowest (i.e., most local) level of government which has sufficient authority to exercise effective control over all of the individuals who are involved in the situation addressed by the policy. Assigning the administrative responsibility for a public policy to any lower level of government necessarily will prevent the agency to which the responsibility is assigned from applying the policy to all of the individuals who are involved in the situation which the policy addresses and, hence, will generally preclude any possibility of attaining social optimality through the application of the policy. Conversely, assigning this responsibility to any higher level of government normally will decrease the responsiveness of the administration of the policy to the interest of the individuals to whom the policy is applied. Thus, theoretically, the responsibility for the administration of a policy for the control of a particular externality should be assigned to the lowest level of government which includes as constituents all of the individuals who are affected by the externality; while the responsibility for the administration of a policy concerning the provision of a particular public facility should be assigned to the lowest level of government which includes within its jurisdiction all of the parcels of land which might be efficiently served by a single public facility system of this type.

However, this theoretical rationale for the assignment of administrative responsibility ignores several practical considerations associated with the administration of public policies. First, the cost of administering a public policy is not independent of the level of government to which the responsibility for this administration is assigned. Rather, since the assignment of the responsibility for the administration of any particular policy to successively higher levels of government normally will systematically increase the complexity of the decision-making hierarchy which is required to perform this administration, it can generally be expected that the cost of administering any particular policy will increase as the level of government to which the responsibility for this administration is assigned increases. Consequently, in selecting the most appropriate level of government for the administration of any particular policy, it will generally be necessary to balance the expected increase in the probability of attaining social optimality which is associated with the assignment of the responsibility for the administration of the policy to a higher, more comprehensive level of

government against the increased cost of administering this policy which will be precipitated by this reassignment of administrative responsibility.

Second, since the capabilities which are required to perform the administration of any new policy may exhibit strong similarities to the capabilities required for the administration of existing policies and since the cost of initiating the application of the new policy is likely to be substantially lower if the responsibility for its administration is assigned to a level of government which has already assembled and coordinated the capabilities required for this administration in its administration of another policy than if this responsibility is assigned to a level of government which has not yet developed these capabilities, it can generally be expected that the total cost of administering any particular policy will be lower if the responsibility for its administration is assigned to a level of government which has already developed the capabilities required for this administration in another context than if this responsibility is assigned to some other level of government. Thus, in the context of the policies which have been analyzed in the previous seven sections, comparative administrative advantages should exist for the assignment of the responsibility for the administration of a policy of ad valorem property taxation with tax rates conditional upon land use to a level of government which already administers a standard property tax policy and for the assignment of the responsibility for the administration of the public purchase of scenic or environment easements to a level of government which already has substantial experience with exercising the power of eminent domain and for the assignment of the responsibility for the administration of a policy which requires the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments to a level of government which already is responsible for the provision of some of these public facilities. However, once again, in selecting the most appropriate level of government for the administration of any of these policies, it will generally be necessary to balance the cost of administering the policy which is associated with the assignment of the responsibility for this administration to any particular level of government against the expected probability of attaining social optimality which is provided by this assignment of administrative responsibility.

Yet, it is impossible to perform this balancing of the relative advantages and disadvantages of assigning the responsibility for the administration of any of the previously analyzed policies to any particular level of government without detailed knowledge of both the technical

characteristics of the externality or public facility situation to which this policy will be applied and the initial and ongoing administrative costs which will be associated with any particular assignment of responsibility for the administration of the policy. Unfortunately, the resource constraints of this project have precluded the accumulation of this detailed knowledge for even a small sample of political jurisdictions. Moreover, even if this information were collected for a representative sample of political jurisdictions for each of the previously analyzed policies, it is unlikely that this sample information would support the determination of a single optimal level of government for the administration on any particular policy in all situations. Rather, it is likely that, because of differences in the technical characteristics of the various externality or public facility situations to which a particular policy can be applied or because of differences in the administrative structures of superficially similar public agencies in different political jurisdictions, the most appropriate level of government for the implementation of any particular policy will not be uniform across all situations in which the policy might be applied. In fact, it is conceivable that the responsibility for the administration of most of the previously analyzed policies in any particular geographic area might appropriately be assigned simultaneously to several different levels of government. Thus, it might be socially desirable to permit public agencies at several different levels of government to purchase scenic or environmental easements simultaneously in the same geographic area or to assign the responsibility for requiring the owners of new developments to pay the full additional cost of expansions of different public facilities in a particular geographic area to public agencies at different levels of government (e.g., to finance the provision of police and fire protection at the local level of government, while financing the provision of sewerage service at the regional level of government). However, the determination of the most appropriate level or levels of government for the administration of any particular policy in any particular situation will virtually inevitably constitute an empirical issue which cannot be resolved definitively solely on the basis of theoretical considerations -- although theoretical considerations might be able to limit substantially the range of alternative levels of government to which this administrative responsibility might be assigned.

## 5.9 Conclusions and Recommendations

The preceding analysis clearly demonstrates that, in any realistic situation, none of the policies evaluated in this chapter can reasonably be expected to promote unambiguously the attainment of social optimality. Therefore, it is extremely unlikely that the implementation of any of the policies actually would result in the establishment of the socially optimal pattern of development in any realistic situation.

However, the socially optimal pattern of development is a theoretical concept whose mere identification in any situation involving either externalities or the provision of public facilities requires the availability of perfectly accurate information concerning the tastes and preferences of all utility-maximizing individuals who are affected by the situation, the revenue opportunities of all profit-maximizing individuals who are involved in the situation, the cost conditions confronting these utility-maximizing and profit-maximizing individuals both separately and in combination, and the social welfare function of the community in which the situation has arisen. Moreover, as the analysis in the preceding sections has demonstrated, the obtaining of this perfectly accurate information is, at best, costly and, for some items, theoretically impossible. Recognizing these practical difficulties in even identifying the socially optimal pattern of development, it becomes obvious that the development of any policy which will unambiguously promote the attainment of this pattern of development will almost inevitably be impossible.

Consequently, it is obviously unreasonable to adopt as a necessary condition for the implementation of any policy for the control of externalities or the provision of public facilities a requirement that the policy must unambiguously promote the attainment of the socially optimal pattern of development. Rather, in making a decision concerning the social desirability of developing and implementing any policy for the control of externalities or the provision of public facilities, it is more reasonable to base this decision upon the ability of the policy to promote the attainment of a pattern of development which is more socially desirable than the pattern of development whose attainment will be promoted by any other policy which has been developed for the same purpose.

On the basis of this criterion, it is possible to generate some preliminary conclusions concerning the potential social desirability of

implementing the various policies which have been evaluated in this chapter. However, unfortunately, the resource limitations of this project have precluded both the surveying of political attitudes and the measurement of public and private administrative costs which would be required for the provision of a definitive recommendation concerning the social desirability of implementing each of these policies. Nevertheless, the theoretical analyses developed in this report do provide sufficient information to support relatively strong conclusions concerning the general social undesirability of implementing several of these policies.

In particular, these analyses strongly suggest that the implementation of a policy of ad valorem property taxation with tax rates conditional upon land use generally will be socially undesirable because any realistic policy of this type can be expected in many instances to provide incentives to property owners which not only fail to encourage these property owners to perform certain socially desirable actions, but actually discourage these property owners from performing these socially desirable actions. Moreover, this policy's requirement that the total tax bill which is imposed upon any property to which a particular land use classification is assigned must be strictly proportional to the assessed value of the parcel can reasonably be expected to cause this policy to produce a pattern of development which is less socially desirable than the pattern of development which would have been produced in the same situation by a more flexible policy for the control of externalities.

Similarly, it will generally be socially undesirable to implement a policy requiring the transfer of lump-sum payments for externalities prior to changes in the permissible land use status of properties. The extreme volume of information which is required for the development and implementation of a policy of this type necessarily will cause the cost of developing this policy in any realistic situation to exceed the cost of developing many alternative policies for the control of externalities. Moreover, the theoretical and practical difficulties associated with obtaining reasonably accurate estimates of a substantial portion of this desired information inevitably will cause the structure of payments which initially is embodied within a policy of this type in any realistic situation to deviate sufficiently from the socially optimal structure of payments that the implementation of the policy will produce a pattern of development which is less socially desirable than the patterns of development which would have been produced in this same situation by some alternative policies with more modest information requirements.

Finally, since a policy requiring lump-sum payments for externalities requires the transfer of a payment only on those relatively infrequent occasions when modifications of activity are initiated which entail changes in land use classifications, the likelihood that the payments which are initially specified in a policy of this type will be adjusted appropriately to correct for initial errors in estimation can be expected to be substantially lower than the likelihood that adjustments of this type will be performed in policies which are applied on a regular periodic basis. Thus, the social undesirability of adopting a policy requiring lump-sum payments for externalities relative to alternative policies for the control of externalities can be expected to increase, rather than decrease, over time.

Next, it appears doubtful that it will be socially desirable to establish a policy of convening public hearings involving all individuals who are affected by particular externalities to promote negotiated settlements of these externality problems. Public hearings of this type are likely to be successful in producing unambiguously socially desirable negotiated settlements only in externality situations which involve only a small number of individuals -- externality situations in which private negotiations are also reasonably likely to produce mutually agreeable and, hence, socially desirable settlements. However, in externality situations which involve relatively large numbers of individuals, it is extremely likely either that no negotiated settlement will be attained or, if less than the unanimous consent of all of the individuals who are involved in the negotiations is required for the adoption of a settlement, that the pattern of development which is produced by the negotiated settlements which actually are adopted will not be any more socially desirable than the patterns of development which would have been produced in the same situation by some other policy for the control of externalities.

Finally, the adoption of a policy encouraging the formation of landowner development corporations will virtually inevitably be socially undesirable because the formation of a landowner development corporation which is sufficiently comprehensive to control effectively the externalities which arise among private land uses in a geographic area necessarily will provide to the shareholders of this corporation substantial monopoly control over the development and use of land in this area. Since the formulation of a public policy to regulate the corporation's exploitation of this monopoly power will require the accumulation of the same information which will be required for the development of a public policy to control the generation of externalities among private



land uses directly, the formation of a landowner development corporation will provide no particular benefits for society and, hence, should not be encouraged.

However, the remaining three policies which have been analyzed in this chapter appear to exhibit sufficient potential as mechanisms for the socially desirable control of externalities or the socially desirable provision of public facilities to warrant further consideration for implementation. In particular, both the imposition of annual "externality" fees and the public purchase of scenic or environmental easements offer sufficient flexibility in their tax and subsidy structures at any point in time and sufficient adaptability of these structures over time to present the possibility that the implementation of these policies will produce increases in the social desirability of the pattern of development in a geographic area which are large enough to justify incurring the costs of developing and implementing these policies. Similarly, a policy which attempts to require the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve their developments should cause these property owners to bear a sufficiently larger portion of this full additional cost than they bear under the prevailing methods of financing the provision of expansions of public facilities to produce an increase in the social desirability of the pattern of development in a geographic area which is large enough to justify incurring the costs of formulating and implementing this pricing policy.

Nevertheless, it is impossible to advance an unqualified recommendation that any of these three policies should actually be applied in any geographic area solely on the basis of the theoretical analyses developed in this report. Rather, it will be necessary to perform additional research into the administrative requirements, political acceptability, and information processing needs of each of these policies before an unqualified recommendation can be expressed concerning the social desirability of adopting any of these policies.